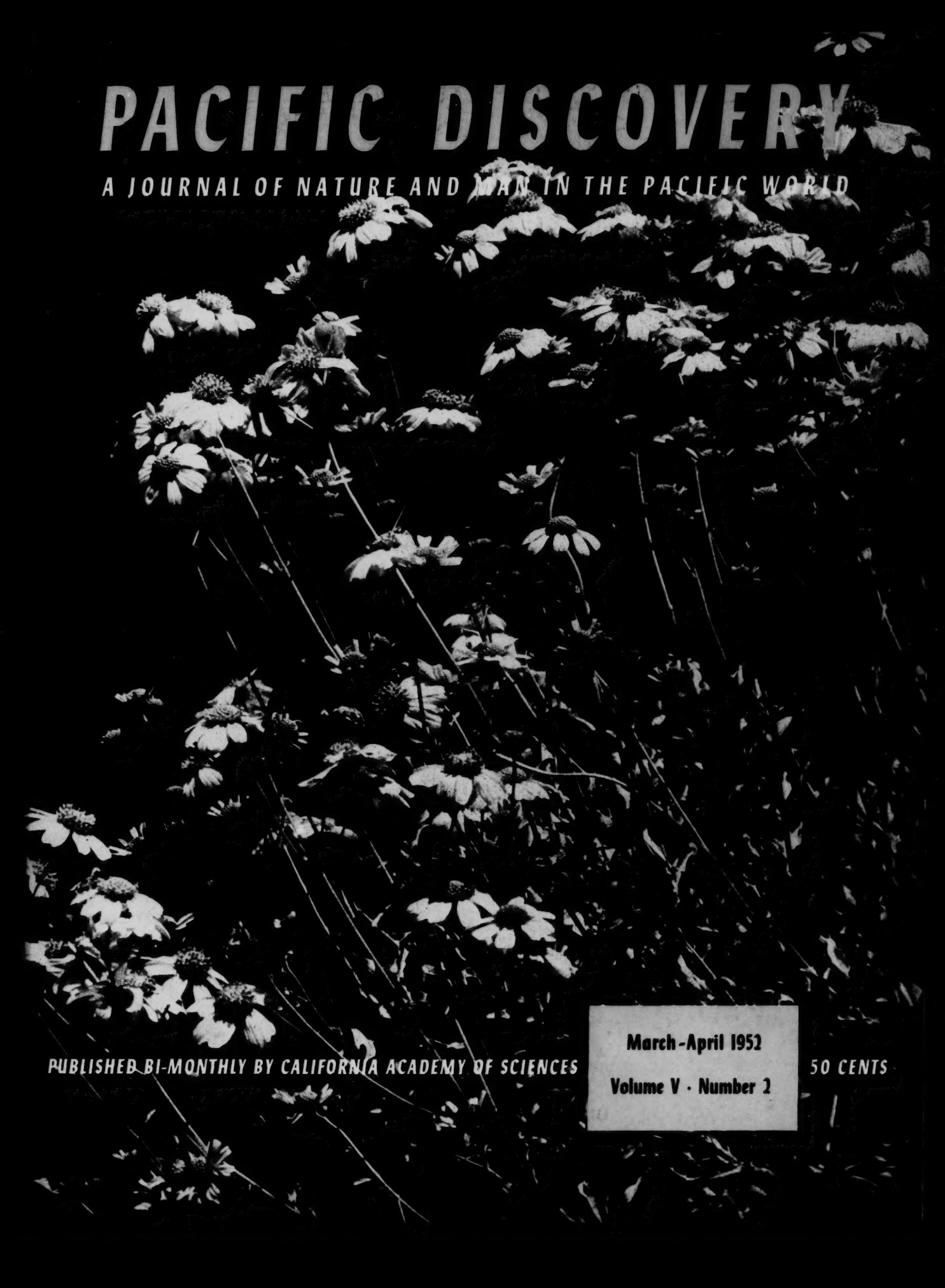
PACIFIC DISCOVERY

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD



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A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

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PRE-DISCOVERY

"DURING THE HUCKLEBERRY SEASON when I was a boy, fifty or more years ago, I used to see Indians, hundreds of them, jogging along on their Cayuse ponies, on their way to pick in the berry fields in the high country near Mount Adams, second highest peak in the state of Washington. . . In the old days the huckleberry pilgrimage was a vivid sight, with each tribe headed by its chief decked out in his bright blanket and other trappings. . . but one by one the old customs are either gone or on the way out. Fifteen years ago the U. S. Forest Service decided they should be photographed before it was too late." The boy who had watched the Indians come from all over the Northwest became a forest ranger with "four Indian national forest campgrounds in my bailiwick." Thus Ray M. Filloon, now of Portland, became the real "old timer" fitted for the task of recording the annual event—"the subjects of some of the pictures" illustrating his article in the May-June special *Northwest* issue "are not available for photographs today. They belong to a bygone era." . . . ¶ Donald Culross Peattie, writing on "The Canoe Cedar," also tells of passing customs of the Northwest Indians, and of a stirring episode in the days of exploration.

With this Southwest desert issue and the coming Northwest issue — others are projected — *PD* is experimenting: Why not, the editorial board decided, try out the idea of special issues each devoted largely to one subject? This could be anything from a region to a particular branch of the natural sciences. Granted that a given issue thus concentrated would not appeal to every reader, to many it would have the added value of better coverage of one of the limitless subjects within the scope of this journal. Every such issue would gain in permanent value. Naturally we shall continue to have general issues, too. The readers alone can furnish the results of *PD's* experiment. Write us a preliminary report on this special issue — now! If the idea appeals to you, your suggestions are welcome, and will be carefully considered.

DISCOVERING PD'S AUTHORS

THE ACADEMY curator of insects, **Dr. Edward S. Ross,** has explored deserts in our own Southwest, in Mexico, and in Peru, Chile, and Argentina. Experience and interest, both, qualify him for "Introducing the Desert." . . ¶ "The Desert Palm" is a chapter of **Donald Culross Peattie's** *The Natural History of the Western Trees,* companion to his beautiful *A Natural History of Trees of Eastern and Central North America* (1950). Houghton Mifflin, publisher of both books, will bring out the new volume this autumn. Paul Landacre's lovely drawings in them are perfect counterpoint to the style of mind and pen that with *An Almanac for Moderns,* a dozen books ago, made Peattie a favorite wherever great nature writing is read. . . ¶ With a set of **Don Ollis'** desert flower photographs waiting for a "good year," the search for the outstanding literary accompanist naturally began and ended with **Edmund C. Jaeger.** The name of that Riverside teacher and leading desert naturalist at once recalls not only his *Desert Wild Flowers* but the earlier *Denizens of the Desert* (1922), *The California Deserts* (1933), and *Our Desert Neighbors* (1950) — all published by Stanford University Press except *Denizens,* by Houghton Mifflin. . . ¶ **Dolores B. Jeffords** writes from Baltimore that she grew up with the "Lilies That Bloom in Deserts," and sent the **Josef Muench** photos to prove she still loves desert beauty. . . ¶ Dry places needn't make dry reading, as **Harold O. Weight** showed last issue with "Las Tinajas Altas." Again it was a set of Don Ollis' pix that sent us in search of an author, and the editor of *Calico Print* graciously obliged with "Valley of Fabled Death" even though he has a Death Valley photo file of his own. . . ¶ Beginning a new series, Pacific Profiles, Dr. Ira L. Wiggins, himself an authority on desert flora, takes as his subject "Thomas H. Kearney," distinguished senior author of *Arizona Flora.* D.G.K.

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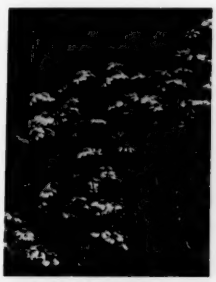

THE COVER COPY

INCIENSO, brittle-bush—in either Spanish or English *Encelia farinosa* makes dry, rocky desert slopes gay with its clear yellow throughout the spring. "The stems exude a gum that was chewed by the Indians and also was used as incense in the churches of Baja California," Dr. Thomas H. Kearney says in *Arizona Flora.* (DON OLLIS)

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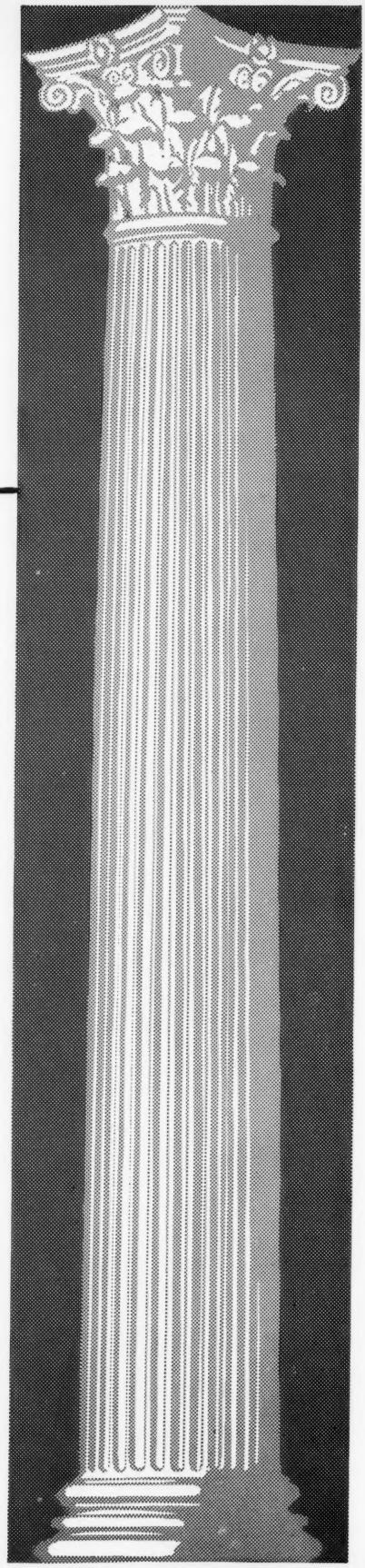

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Introducing the Desert

EDWARD S. ROSS

THIS ISSUE of *Pacific Discovery* blossoms forth at a time of year when most nature-wise Westerners try to escape for at least a brief sojourn in the desert. It is only natural for them to choose this time of year — a time when the desert is least desert-like. The unusually heavy winter rains that caused many a hillside home to slip down to a less scenic position are certain to make this a year of years for those who like their deserts succulent and wild with color. In anticipation we present a bouquet of desert articles, to which this is introductory.

It is always a good idea to look into the background of the terms we use. I found that the word desert is, by way of Old French, the past participle (desertus) of the Latin verb *deserere,* which means "to desert" *(de* + *serere* to join together) In its strict sense the word applies to any unoccupied, forsaken, or solitary place, regardless of its climate. Anyone who has visited a desert resort, such as Palm Springs, during the peak of the season well knows how far the word desert has now been corrupted from its original meaning.

Within the zones of latitude and altitude preferred by man, however, the most common cause of a lack of human population is aridity. Thus a connotation of the word desert developed to cover any dry region unsuited for human use except through the bringing in of an artificial supply of water. Common usage now forces acceptance of this meaning.

Unfortunately, the human-use criterion is of little value to biologists trying to limit the term desert. Obviously the controlling factor is the amount of annual precipitation and its seasonal distribution. Annual precipitation may vary from practically nothing to the greatest known rainfall on earth, which "is on the windward side of a low mountain on the island of Kauai in the Hawaiian group where the average amount is over 450 in." (Trewartha). Since even in deserts, at the low end of the scale, the extremes are relatively great (Trewartha says that at Arica in northern Chile the rainfall over a 17-year period was only 0.02 inches, but states that the high end of the scale of desert precipitation falls somewhere between 10 and 20 inches), we can see that there can be as many different kinds or degrees of desert as there are arid places. Frequently, in intermediate climatic zones, an area may appear to be desert most of the year, with bare, thorny trees and cacti dominating the scene — then suddenly change into a lush, green jungle during the rainy season.

Along the west coast of the Americas we can see some of the climatic influences at work which are common causes of aridity in any part of the world. Direction and origin of rain-bearing winds and influence of ocean currents are very important. Thus, along our Pacific Coast, where most of the rain comes out of the Northwest during the winter months, we see a steady decrease in precipitation as we move southward from this source. Finally, in Baja California, we find extreme desert conditions touching the seashore (the Vizcaíno Desert). The same progression occurs in reverse, compass-wise, as we move toward Cape Horn up the southern latitudes west of the Andean cordilleras of South America.

Topography, of course, is part of this picture. Rain-bearing winds tend to dump their water load on the windward sides of mountain ranges; this creates what is called a "rain shadow" to leeward of such mountains — a zone of reduced rainfall. Thus, the real California deserts occur east of the longitudinal southern California ranges, and their geological age is correlated with the rise of the mountains.

It is not mere chance but a combination of landform and prevailing wind that put the world's driest desert, the Atacama of northern Chile, in the rain shadow west of the world's greatest mountain range, the Andean cordillera, at its widest point. In this case the rains falling on the opposite (eastern) slopes of the range give rise to the world's vastest river system and biggest forest.

Arid regions have always attracted biologists because in them the workings of physical and biological processes are so dramatically revealed. True, most of the same processes operate in forested or other densely vegetated areas, but their action is often slower and less spectacular. Such a phenomenon as parallel evolution of structure and function in totally unrelated species goes on in noncontiguous forested regions as well as in widely separated deserts, but examples found in the non-arid areas are often less striking or obvious. One can state both literally and figuratively that the nature of things is laid bare for study in the desert. We have no trouble "seeing the forest because of the trees."

One need only consider the science of geology to grasp this point. In the desert, the mountains and their rock formations are usually devoid of soil or much vegetative cover. It is no coincidence, therefore, that perhaps more mineral deposits are discovered and worked in arid regions than in wet ones, and that there are more "rockhounds" in the Southwest than there are in our rainier regions. Many basic geological processes, particularly erosion, are more active and evident in deserts. One occasional desert storm may cause more surface change than is apparent after decades of weathering on landscapes shielded by a mantle of soil and vegetation.

The effect of aridity on living things is no less impressive than the rugged scene itself. To me, plants and animals of the desert seem to fall into two basic categories, between which there may of course be intergradation. First, there are plants and animals that appear to be truly adapted to the desert and are in evidence all, or most, of the year and active during daylight hours. Into the second category I put the desert evaders – probably the bulk of desert life – which are active or in evidence only during limited periods of the year, such as in and just after the brief rainy season when the desert isn't so desert; or which – the animals – evade much of the rigor of desert life by hiding out through the day and becoming active only in the cool of the night. (This matter of evasion could, on the other hand, be classified as a form of adaptation or at least adjustment to aridity, but, either way, it constitutes a useful division.)

Let us examine each of these classes in greater detail: first, the life that faces or endures the desert at its worst. Here belong most of the plants and animals that are truly characteristic of the desert and dominate its scene. Cacti, yuccas, agaves, and the hardy desert trees and shrubs are familiar examples. One must admire any living thing which can endure the high surface temperatures prevailing in the usually cloudless, hazeless, summer desert season. The basic problem of the plants is the acquisition and retention of water. Mr. Jaeger's excellent article in this issue informs us of some of the methods by which these plants solve, or attempt to solve this problem.*

As compared to the plants, which, by their very nature, must hold their ground, the kinds of animals that venture out under the desert's noonday summer sun are indeed few in number. Lizards and insects provide the best examples. It is interesting to note that such diurnal animals often assume the color and pattern of the desert floor across which they must, on occasion, move fully exposed to their enemies. Grasshoppers thus colored and marked must, nevertheless, fall prey to similarly marked, sharp-eyed lizards which are in turn prey to hawks silently gliding overhead.

Again, we are indebted to Mr. Jaeger's article for a discussion of the plants that persist in a desert region by evasion in the form of drought-defying seeds, tubers, or bulbs. So I needn't treat them here.

The majority of desert animals are, as I said before, desert evaders. They may evade the dry season by being inactive or in some resistant stage in some protected place. Those that must be active during the warmer periods of the year avoid the desiccating heat of the day by hiding under stones, among surface litter in the shade of plants, buried in the sand, or – an interesting fact – in the cool depths of animal burrows. Without animals to do the digging of such retreats, the desert fauna of insects, for example, would be tremendously reduced. At dusk the desert comes to life. Any naturalist well knows that he had best work at night and conform to the diurnal sleeping habits of the things he wishes to study if he is to learn much of the habits of desert life.

One might well ask why so many plant and animal species have evolutionarily ventured out to become established in the desert when there are so many pleasanter places to live. This is like ask-

The elephant tree – it grows only in one of the most arid zones of our Pacific Coast, the Vizcaíno Desert of Baja California – exemplifies some of the very best of plant adjustment to desert life. In spite of its bare look this specimen is in full, pink bloom and in full leaf! Water cannot be spared for large leaves and blossoms. The roots absorb the sporadic, scanty rainfall, and the water is stored in the elephantoid trunk and branches. The tissue-like bark flashes like aluminum paint and reflects the sun's hot, water-absorbing rays. These strange trees grow in well drained places in company with the weird pole-like boogum tree, *Idria columnaris* (one stands straight in the center background) and the ocotillo (left). The elephant tree, *Pachycormus discolor* (family Anacardiaceae) – not to be confused wit the "elephant tree" of San Diego County (family Burseraceae) – and the *Idria* are the only representatives of their genera and found nowhere but in central Baja California. (A. E. Michelbacher)

*See also *The Desert Year*, by Joseph Wood Krutch (reviewed in this issue) for another excellent account of this.—EDITOR

ing a farmer struggling to raise crops in his peculiar way on some arid piece of land why he didn't choose some rich, moist bottomland for his farm. He would probably answer that all such good land was already occupied or available only at a price far beyond his means. Under these circumstances he was forced to adapt himself, perhaps by digging a deeper well or choosing special crops or methods, to less desirable land that wasn't already taken up. This dry-farmer is likely to fail but their is a possibility that he may become well adapted, even successful, to the point of preferring his desert farm to all others.

So it is with plants and animals. Their greatest competition, just as with humankind, is with members of their own species which are all after the same things in life. There is a constant tendency to reduce or avoid this competition by venturing out into marginal environments where this competition is less keenly felt. Mutations, constantly being thrown out for test by most animals and plants, make this experimentation — or adaptive radiation — possible. In the case of our Southwest deserts most such radiation has been on the part of American tropical species that have come up through the seasonally dry zones, such as the deciduous thorn forests of Mexico. Over great periods of evolutionary time the population which has thus radiated may become disconnected geographically or environmentally from the parent stock. This tends to augment the inbreeding of peculiar characteristics (not always adaptive) which in time define species and genera. Those forms that have become adapted to the desert may then develop a reversal of the adaptive trend and thereby reduce the same old competition, now in a desert environment, by trending toward the very moist environments their ancient ancestors radiated out of — so on, ad infinitum. In short, the desert is one of the great workshops of evolution; innovations are in order, and they must withstand the most rigorous of tests.

Look for some of this drama during your trip to the desert and your stay will be more pleasurable and satisfying. You will experience the thrill of scientific observation, and become, in your own right, an explorer — finding and understanding what is new to *you* is a kind of discovery. END

A palm oasis near Desert Hot Springs in California's Colorado Desert. (Don Ollis)

The Desert Palm

DONALD CULROSS PEATTIE

Photographs by Lucile & Harold Weight : Don Ollis

On its many merits, the Washington or California fan palm has made its way around the gardens of this world wherever a palm can be grown, and under glass in colder climes. In Hawaii and Algeria it is now so familiar in the landscape of cultivated districts as to seem like a native. Indeed, in Hawaii it has received a thoroughly native-sounding name, the hula palm, in allusion to its skirt-like thatch of dead leaves hanging beneath the crown of living ones, like the grass skirt of a Polynesian dancer. The same appellation has been applied to it in Florida, where it is now a familiar garden and street tree. On the Riviera it is highly prized. No other palm indigenous in this country has proved so popular in cultivation. Yet in the wild it has always been a rare species within the borders of the United States, and until Palm Springs (which takes its name from this tree) became a winter resort, in the second decade of this century, few indeed, except bands of Indians and old "desert rats" or wandering prospectors, had ever seen it growing natively, with an artless dignity, a wild, desertic fitness, that it never wholly possesses in the flashy horticulture of subtropical cities.

The chosen habitat of the desert palm, as it is called where it is native, is, though so restricted, one of the grandest on the continent. For this tree inhabits the canyons at the foot of the eastern or desert side of the Coast Ranges in Riverside and San Diego counties. From elevations of over 11,000 feet, in the San Jacinto Mountains, where lodgepole pines stand all winter amid glittering snows, the surface of the planet here drops abruptly for two vertical miles to the floor of the intensely desertic Coachella Valley. Portions of this chasm lie below sea level, as if a great block of the earth had slipped out of place and sunk deep. And this indeed is probably the case; the Gulf of California, our American Red Sea, is doubtless but a portion of the same deep planetary crack, now filled with ocean water; and fossil oyster beds and old shore lines around the Coachella Valley show that in former geologic times the Gulf was here, or there was at least a landlocked salt lake, a sort of Dead Sea, of which the enameled blue of the Salton Sea is a recent manifestation.

Around the shores of this vanished sea are dotted the scattered colonies of our palm. They are found at the bay-like bases of the canyons, between the waterless capes of the San Jacintos' buttressing ridges. They cling to last waterholes in the Little San Bernardino Mountains which enclose the Coachella Valley to the east. All the way down the inner face of the Coast Ranges to the Mexican boundary, and beyond, into Baja California, colonies of palms cluster wherever there are mountain walls to give them shade, for part of the day, from the fierce desert sun, and springs or streams or the least slow seepage to nourish their deep, far-traveling roots. A few of these groves, near the popular resorts, are visited yearly now by many thousands of people, but most of them still are little accessible, and some, perhaps, are not visited for years together. In profound, desert loneliness they catch, each morning as the planet rolls eastward, the first fierce rays of the sun, spilling it in swords of light from the ribs and finger-like lobes of their fronds. Each year they produce, all unseen, their great compound bunches of creamy flowers, and ripen their black berries, and drop their horny seeds. They have no company but the trade rats and lizards that scuttle under the thatch of dead leaves around the stem, and the liquid raptures of the canyon wren who nests behind the thatch, or the rolling whistle of orioles that hang their nests from under the living fanfronds upon threads made of the long fibers of the leaves themselves.

Yet though so rare a tree, the Washington palm was early discovered by Europeans. On March 29, 1769, the Franciscan Father Juan Crespi, chronicler of the Portolá Expedition, observed it 30 miles north-northwest of Vallicola, Baja California, near the future site of Mission San Fernando. He speaks of camping here, after a desolate *jornada,* under the grateful shade of a grove of fine palms, and since Washingtonias are the only palms growing there, no doubt can be entertained of their identity. On May 24 of the same year, the immortal Padre Junípero Serra mentions palms at the same spot.

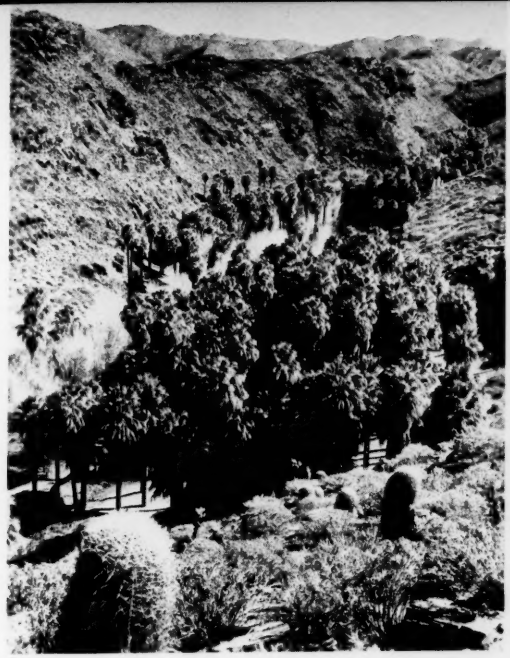
So, contrary to widely accepted opinion in California, the "Mission Fathers" (Franciscans) did not bring the palm here from the Holy Land, or from Spain. It is doubtful indeed if they planted it extensively around their missions, for most of their plantings were of preëminently useful plants like the olive and the grape, healing herbs and vegetables. At any rate, the entry of this palm, so rare or at least inaccessible in nature, into world-wide horticulture, dates chiefly from times well after its first description, in 1860, at the hands of

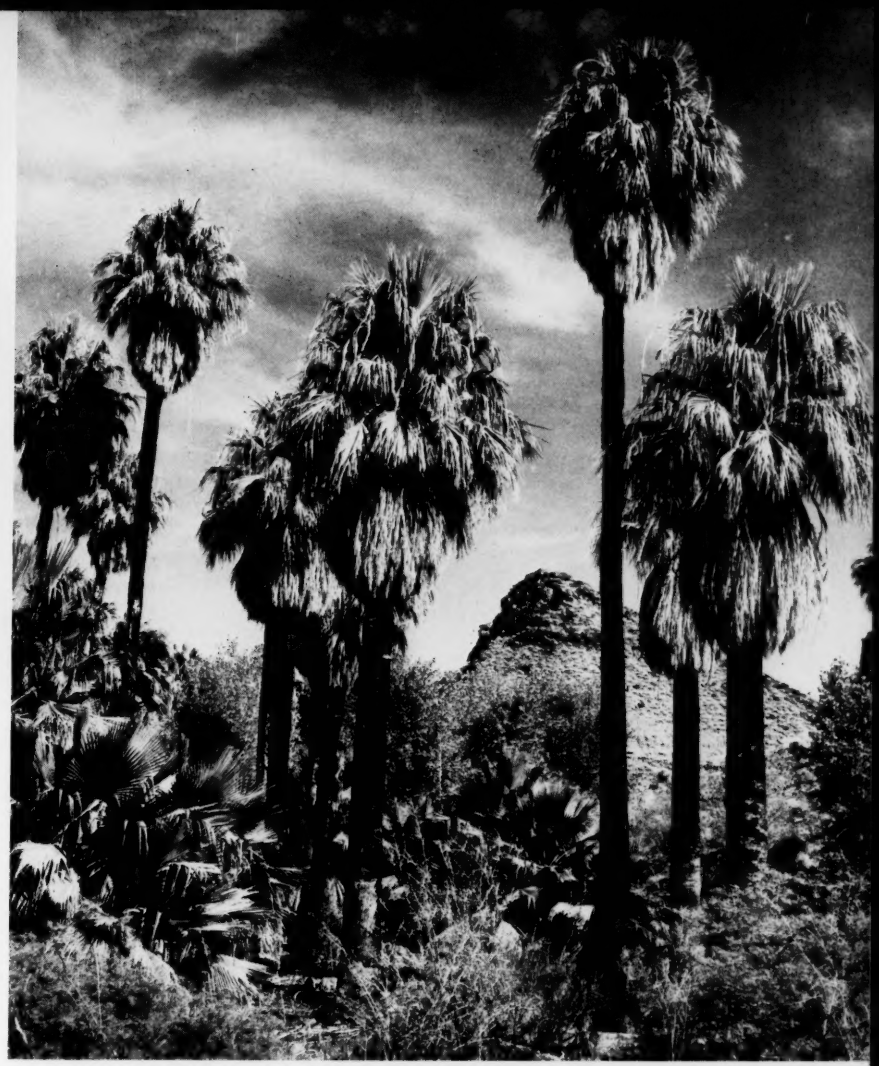
scientists. Originally ascribed to a different tribe of palms, it was finally placed, by the German specialist Hermann Wendland, in a new genus, named in honor of "the great George Washington," as befitting this noble American tree.

Yet well before our palm received a scientific name, its presence within the boundaries of the United States had been discovered under dramatic circumstances when Col. William Hemsley Emory, "Bold Emory" as his fellow West-Pointers named him, soldier, explorer, engineer and astronomer, brought, in 1846, General Kearny's Army of the West safely across the terrible wastes of then-unknown desert roamed over by Indian hostiles. At last the sun-scorched, saddle-sore and footsore party, parched with thirst, saw from the Little San Bernardinos the towering, barren rock wall of the San Jacintos, and as they crawled across the Coachella Valley toward the mouth of Carrizo Creek Canyon, at a spot then called the Ojo Grande spring, they descried a shady grove that was not, after all, another mirage. "Here," says Emory in his *Reconnoissance,* "On November 29, several scattered objects were seen projected against the cliffs and hailed by the Florida campaigners, some of whom were along, as old friends. They were cabbage trees and marked the locale of a spring and small patch of grass."

We know now that these trees were not the cabbage palms *(Sabal palmetto)* of Florida, but our own desert palms, the only members of this great tropical family native to the western United States. And we know, too, that the Ojo Grande spring of Emory's day is now no less than Palm Springs, one of the glossiest pleasure resorts in the world, where motion picture stars come to acquire a desert tan while sipping iced drinks at the edge of a swimming pool.

Only ten minutes' automobile ride from the shopping center of Palm Springs, where frothy trifles cost a princely ransom, lies Palm Canyon, the largest of all the groves of desert palm in California, and perhaps in the world. Your car mounts a steep hill, to the parking area, and there below you lies a narrow watered canyon where thousands of these trees go trooping up the winding defile of the mountain. One sees there trees of every size, seedlings and young trees, and old patriarchs whose 70 feet or more of unbranched height is only dwarfed by the towering mountain backdrop of this setting. One sees erect trees, and trees picturesquely canted at all angles. In the desert sunlight the fronds flash proudly. They stir in the canyon draft with a soft lisp and clash. And, deeply cut as the leaf-blades are, into palmate lobes like the fingers of the hand, the narrow, flexible segments move separately and seem to twinkle glittering, beckoning digits. The long marginal filaments streaming and curling in the wind add the final touch of airy grace.



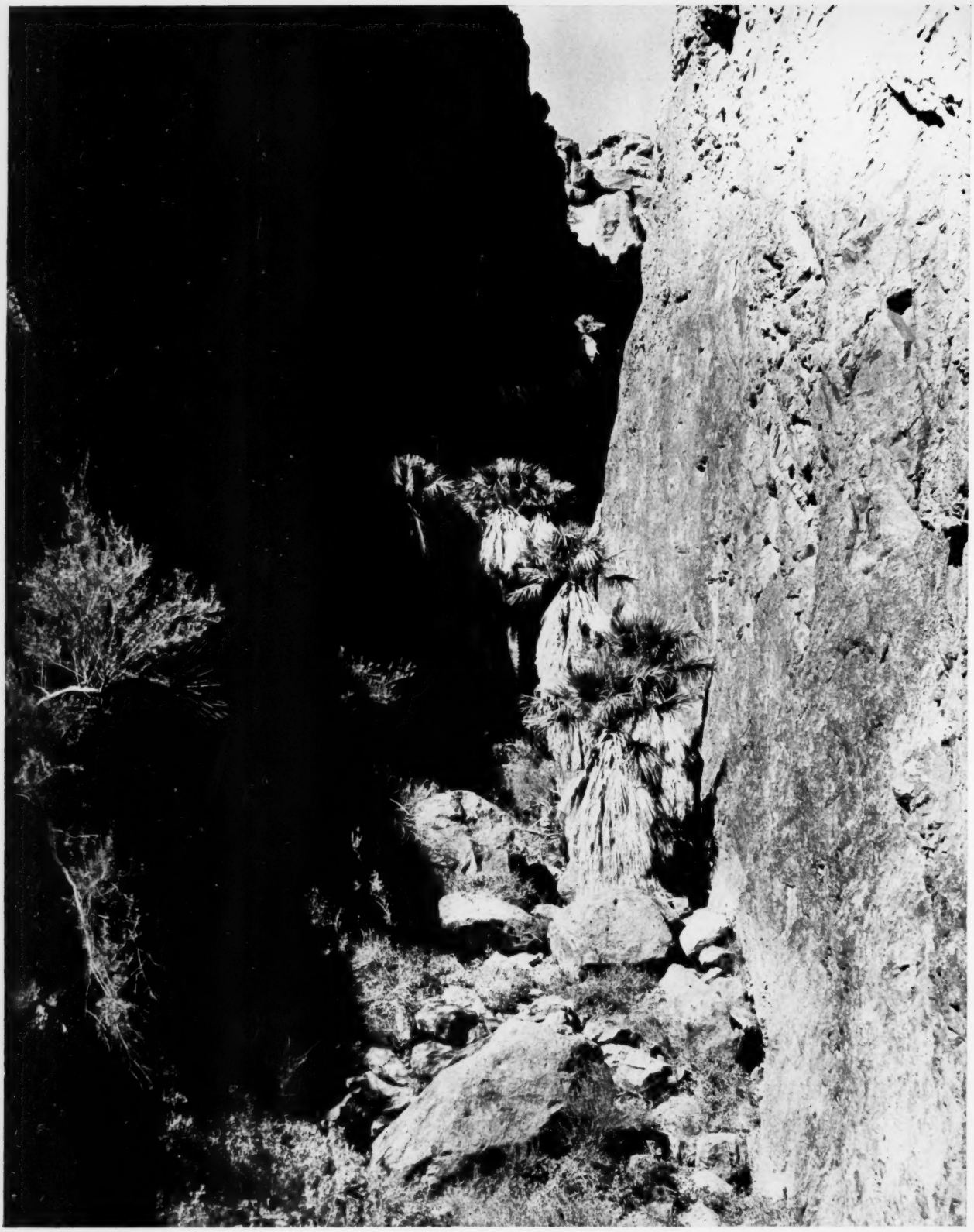


They march down famous Palm Canyon, following a small stream of pure water that flows at the feet of the palms but is obscured by a healthy growth of young trees. This best known locality probably contains more of its namesake tree than any other spot. (Don Ollis)

By moonlight these trees are especially magical —palms indeed seem meant for the moon and warm winds—and then this desertic portion of the planet, its barren features unsoftened by water, seems indeed like some lunar landscape, save for the proud difference of the desert palms, waving life's green banners. Travelers who have been among them during one of the desert's rare but violent summer storms speak of the stiff whistling of the thrashing, living fronds, the hollow drumming of the driven rain upon the armor of dead leaves.

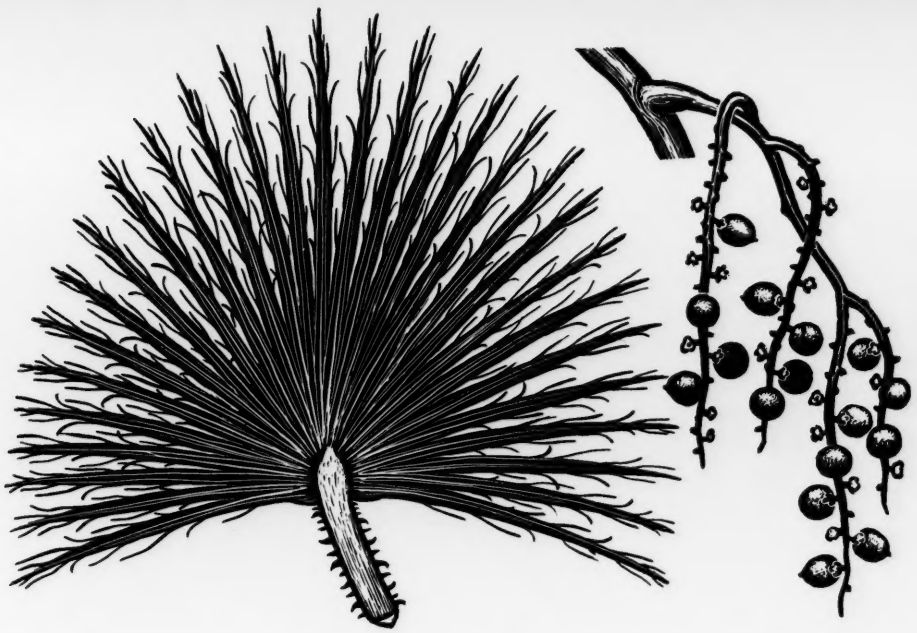
Like other palms, and unlike the conifers and hardwoods, these desert trees have peculiarities that account for their strange ways and habits, almost topsy-turvy to the rules that apply to growth in other trees. Growth, for instance, is all by the great terminal bud. If this be killed—as when the Indians cut it out and roast it—the whole tree will die as surely as a man with his head cut off. This bud gives off all the leaves that the tree will ever bear in the course of its life, and looking down on top of a palm from the mountainsides, one sees leaves in all stages of development, the innermost the youngest, the middle the full-grown, and the outermost beginning to fade and finally hang, head-downward, against the stem. For this palm does not cast its leaves when they die but retains them tenaciously as a dry persistent coat of armor about the stem. Indeed, if not burned or cut away, this shard may enclose the trunk right to the ground like a trouser leg or pantalette. When seen thus in cultivation, our palm is apt to look dingy and unkempt in contrast to the polished formality of city parks and estates of the rich, wherefore gardeners some-

In the thriving main oasis of Mountain Palm Springs, in the desert foothills of San Diego County's Laguna Mountains, stands a group that is, Harold Weight says, probably the one Colonel Emory reported in *Notes of a Military Reconnoissance from Fort Leavenworth in Missouri to San Diego in California* (1848). (Lucile and Harold Weight)



↑ Most spectacular native palm oasis of them all — and the only one known in Arizona — is in Palm Canyon in the Kofa Mountains, north of Yuma. The palms are in a side canyon of the great mountain mass, in a deep and narrow gash which can be reached only by arduous climbing. Harold Weight's guess is that seeds were carried here by birds.

→ Farthest east of California's native palm oases is the beautiful Corn Springs in the Chuckawalla Mountains of eastern Riverside County, southeast of Desert Center. This group was an Indian campground and hangout for prospectors. (Lucile and Harold Weight)



The fan and fruit of the California desert palm as drawn by Paul Landacre for the author's forthcoming *The Natural History of the Western Trees.* The book, to be published in the fall of 1952 by Houghton Mifflin, will include this article as one of its chapters. Another will appear in our May-June issue.

times cut away the dead, reflexed foliage. But this leaves the tree looking skinned and top-heavy, and, having lost its chief distinction, *Washingtonia filifera* now owns no superiority over other and more gracile palms.

Yet in the wild this thatch has a look of rightness and dignity, and its weathered colors harmonize naturally with the desert's tints. The Indians used sometimes to burn off the leaves in the belief (perhaps not unfounded) that a heavier crop of the sweet edible berries would result. The fire permanently blackens the stem but does not otherwise injure the tree, for palms have no true bark to lose, no all-vital cambium-layer under their rind to be killed. And indeed a fire-seared desert palm has a picturesqueness of its own, in the wild, and speaks of the days when it was to the wandering bands of desert tribes what the date palm means to the Arabs and Bedouins. For where it grew it was a sign of water and herbage. Its berries and buds or hearts-of-palm fed the hungry; its seeds were ground into a flour. The leaves were used to thatch the Indian's shelters, and the threads from the foliage served to bind

the cordage of the women's baskets. A band of Indians who found a good palm grove had no reason to hunt further for a settlement site, and even today the famous Palm Canyon grove serves the Agua Caliente Indians on whose reservation it stands, for an Indian collects, for the tribe, a coin from you at the gateway.

It is possible that the Indians sometimes planted this species beyond its primitive range. For instance, the grove at Twentynine Palms, on the Mohave Desert, is not only out of the seemingly normal range of the species, but it is associated with so many archeological remains that one suspects strongly that this is a plantation rather than a natural grove. Certainly it is a strangely magnetic one, what is left of it, inevitably drawing the visitor to the little oasis where, amid cottonwoods and mesquite, these northernmost representatives of the species stand.

Everyone who visits the grove at Twentynine Palms remarks a grave, a small mound ringed about, like a child's play-place, with white quartz stones and honored only with a nameless wooden cross. Here is buried a young girl, who was being brought out on the desert for her health, by her mother, a poor woman hoping to reach the Virginia Dale mines to serve as a cook. When the young spirit left the body, February 10, 1903, the woman turned to the palms as the only beautiful things in all that waste where she could bear to leave her child. Two old desert rats dug the grave and made a narrow coffin; they and an Indian band sang such songs as they knew or thought appropriate; a Bible was produced from somewhere and "an educated mining man" read from it. Then the desert earth was thrown upon the box. For many years the Indians and prospectors laid wild flowers on Mary Whalen's grave. Now only the old palms could remember how long the woman looked back at them as she was led away.

The age to which any palm specimen has attained cannot be told from the tree itself, since palms do not produce annual rings of wood. A few *Washingtonia* specimens in cultivation are known from their planting dates to be over a century old, and probably many of the patriarchal wild trees are two centuries old. At all ages they are the finest trees of the California desert, and for ages yet to come the wild groves will hold a special fascination for all who love that grand and desolate shore of a vanished sea, beyond the towering San Jacintos. END

Golden panicles of the century plant, *Agave deserti*, color low rocky hills and mountain slopes of the western side of the Colorado Desert from mid-April to early May. Desert Indians used to roast and eat the young asparagus-like bud shoots.

...w in the Ground

EDMUND C. JAEGER

DURING THE PAST drought-ridden summer months our deserts seemed to be areas almost devoid of life, sere dusty-gray or gray-green expanses of sand or pebbly soil covered solely by small-leaved woody shrubs. But throughout all this time, lying under the sands, well hidden from the light of summer's blazing sun, great heat, and dryness, were seeds of flowers awaiting—many of them during several years—the coming of copious, well-spaced winter rains, rains that would start them to germinate and grow.

And now that moisture has come to gladden the earth, we see the young plants miraculously coming forth and numerous areas covered with green and a host of bright blossoms. Especially are the upspringing plants markedly plentiful in the narrow zones around small bushes or under the shelter of the larger shrubs such as creosote bushes, cats-claw, and cacti. They are also found in numbers along the edges of dry stream beds and on the lee side of sand dunelets. These are the places where the winds of previous springs and summers have blown the seeds and covered them well with a sheltering blanket of dust and sand. In certain areas of our North American deserts such as in southern New Mexico, Arizona, the mid-region of arid Baja California and western Sonora where sporadic summer rains are sometimes plentiful, even of cloudburst proportions, a second crop of flowers may follow in July and August. But both flower-seasons are always short ones, seldom over six weeks long. In that brief period we see the annual plants hurry from germination to full seed maturity, often without benefit of additional rain.

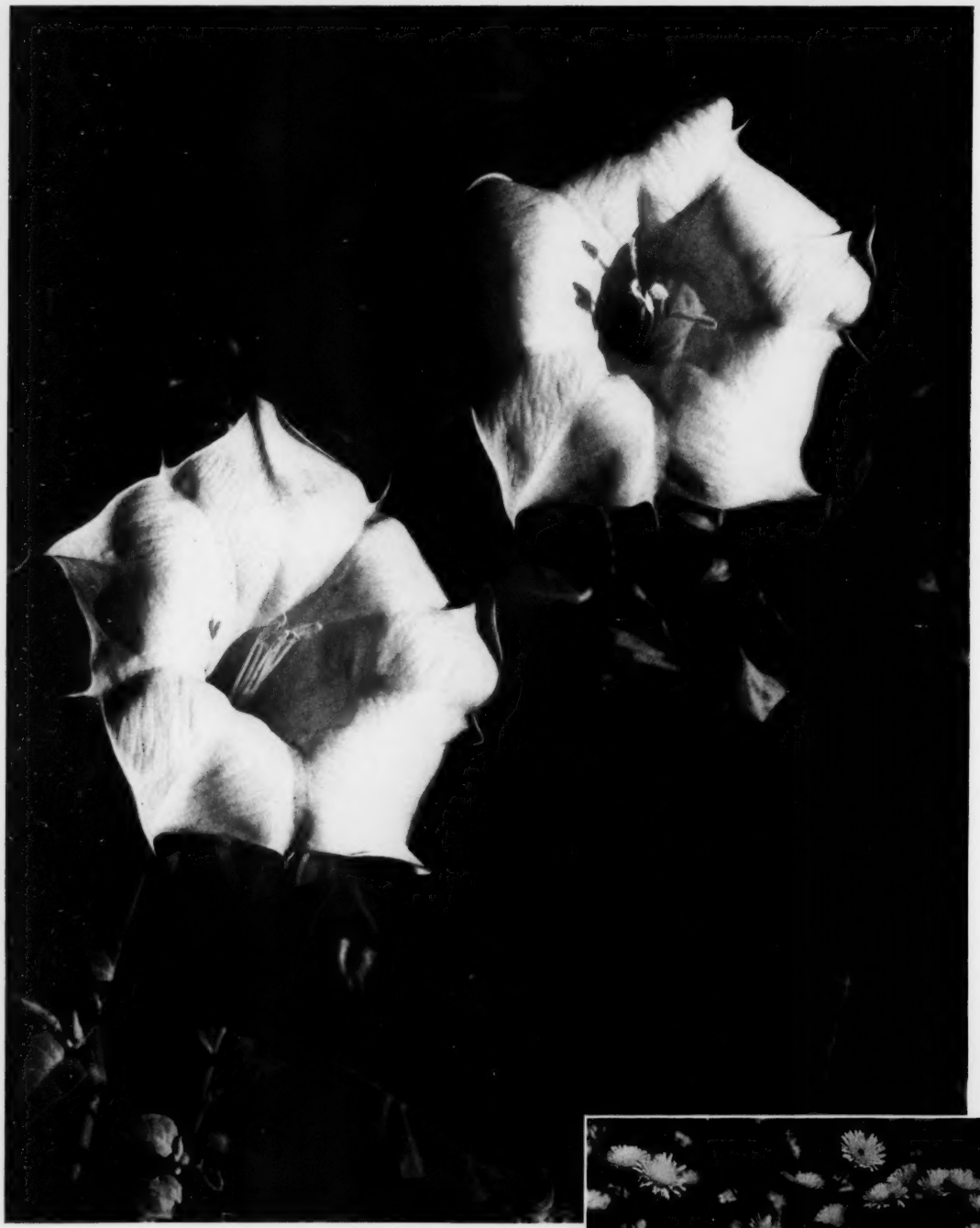
To me it is an ever-recurring marvel how certain of the desert's very specialized annual plants hesitate to grow until almost all visible moisture has evaporated from the soil. In this category of tardy growing annuals are some of the very fine-stemmed buckwheats, bird beaks and small composites such as the vinegar weeds, which, strange as it may seem, flourish best when all other bright-flowering species are drying up and maturing seed. These hardy venturers of the plant world are able to get moisture from sand so dry that it sifts through the hand like driest powder.

Some of the desert shrubs, drawing on deeper water reserves derived from rains of the previous summer, may break into flower in dry spring seasons when the annuals make no attempt to grow. Creosote bush and some species of *Dalea*, such as indigo bush and the smoke tree, are among these robust drought-defying plants.

The cacti, the palo verde trees, some of the yuccas, and wild gourds are exceptional desert plants which store water in their roots or stems. Because of this they often bloom during dry seasons when other plants make no attempt to flower. The bulbous stemmed, water-storing lilies such as the desert day-lily may live on through several dry seasons because their bulbs lie deep buried where water loss through evaporation is much reduced; however, under these drought conditions they have no blossom. But even the hardy cacti cannot endure long severe drought and still bloom. The end of several dry seasons often leaves their stems woefully shrunken. They have, however, wonderful powers of quick rejuvenation. Their long, widely spread, corky-barked roots lie close to the surface and take up quickly waters of shallow-penetrating rains, rains which are too meager to encourage even an attempt at germination of seeds of the ephemeral flowering annuals.

Palo verde trees pass practically unharmed through long drought because of their ability to store water in the spongy wood of the main trunk and larger branches. I recently cut a section from a palo verde tree at the end of a very dry season and found it still heavy with reserve water. I was not then later surprised to find this same tree blooming copiously when scarcely a flowering annual could be found in an hour's walk. The whole tree was now a glorious golden-yellow mass of delicate blossoms set against a background of desert drab. It was the natural mecca of thousands of hungry wild bees which sought its nectar. Later it bore a big supply of seed pods.

There is a curious correlation between certain of the ground dwelling bees and the times of good flower years. When the rains do not come in proper amounts and at propitious times the pupal forms of these insects remain in a state of suspended development against the time when favorable conditions again arise. Their economy is so planned by nature that the factors which induce the seeds of nectar-bearing plants to sprout



Two species of Jimson weed or datura are found on our Southwest deserts: the common large white-flowered *Datura meteloides*, shown here, and the smaller, rarer *D. discolor*. A powerful narcotic, stramonium, is common to all daturas the world over. One of the old Coahuilla Indians once said in all earnestness that he knew a man who, after taking a potion of datura tea, could burrow like a badger beneath a fire and come up on the other side changed into a bear. After enjoying for a time the life of a bear, he went back through his tunnel and came out again, a man! The flowers of datura are pleasantly sweet-odored and ivory-white.

➔ About almost every creosote bush and other low shrub a host of dainty flowering herbs comes forth in early spring to lend bright cheer to the desert. Especially abundant is this bright yellow "dandelion" with a little red "button" in the center of each newly-opening disk-like flower. It blooms persistently for many days.

promote also the development of these bees to maturity and emergence from the soil. It is another of those cases of beautiful timing in nature.

The arrival of a good wild flower crop such as we witness this year always initiates a great upsurge of animal life of many kinds. Seemingly from nowhere are now appearing myriads of flower-feeding insects; also, forms whose larvae eat the succulent leaves. These all offer good food for the birds and there is soon a great influx of desert nesting species with a subsequent rearing of big broods of young. The small rodents such as field mice, pocket gophers and antelope ground squirrels, now supplied with succulent leaves, seeds, and insects on which to feed to fatness, will soon recruit their lost numbers through their numerous quick-developing progeny. The large numbers of these will in turn encourage the multiplication of birds of prey and carnivorous mammals such as coyotes, foxes, and bob cats.

The past seven years of drought have pressed hard indeed on the wildlife of arid lands. It will be interesting, and I dare-say surprising, to note how fast the desert region is again well populated now that favorably spaced rains have come, bringing their full complement of flourishing plants and the animals directly and indirectly dependent upon them.

Because sandy soils readily allow deep penetration and long retention of moisture, some of the very best desert flower fields are to be found in areas of dunes such as the great dunes near Kelso

↑ *Phacelia*, scorpionweed, wild heliotrope — by any of its names this blue-violet to violet-purple flower of the lower plains and mesas has a strong odor, sometimes like onions, occasionally quite foul.
← An always exciting surprise is finding the superbly beautiful, vividly apricot-red or vermilion mariposa lily, *Calochortus Kennedyi*. They generally grow singly, but sometimes in considerable aggregations, preferring gravelly or rocky soil. The plant is usually only about four inches high. There is velvety black at the base of the petal.

on the Mohave Desert and the lesser dunes and mamelons of the Coachella and Imperial valleys of California. Not to be forgotten are the broad valleys south of the Gila River in Arizona. In all these places great numbers of "dune primroses," sand verbenas, sweet smelling spectacle pods, and desert sunflowers flourish. The spectacular blooming shrubs such as cacti, ocotillo, and daleas are found on the coarser gravelly soils of detrital fans which issue from the numerous canyons of the desert mountains and foothills. The traveler in quest of floral splendor should not neglect the spring flower fields of the now-accessible Mexican deserts on either side of the Gulf of California

No flower that grows on the desert sands is of greater popular appeal than the trailing-stemmed, bright lavender or purplish pink annual, the sand verbena, *Abronia villosa.* The species is widespread on the Colorado Desert of California and nearby Arizona, Sonora, and Baja California. Its fragrance is most pronounced in the cool hours of night. Especially fine natural gardens of this cheerful plant grow around Indio and Mecca near the Salton Sea, attracting hundreds of thousands of motorists in good desert flower years.

PHOTOGRAPHS BY DON OLLIS

The charming, wine-scented dune evening primrose, *Oenothera deltoides*, often grows alongside the sand verbena. Although the new buds open at evening time, the large, moon-like white flowers persist throughout the day. At night numerous moths, especially the large sphinx moths, seek the rich nectar. In late March the plants begin to wither. Then the long outstretched main stems curl upward and inward to form the so-called "primrose baskets," much in demand, when gilded, for Christmas ornaments. Both the larger photographs on these two pages show the way desert plants grow in well spaced clumps — there is not enough water for a continuous vegetation cover.

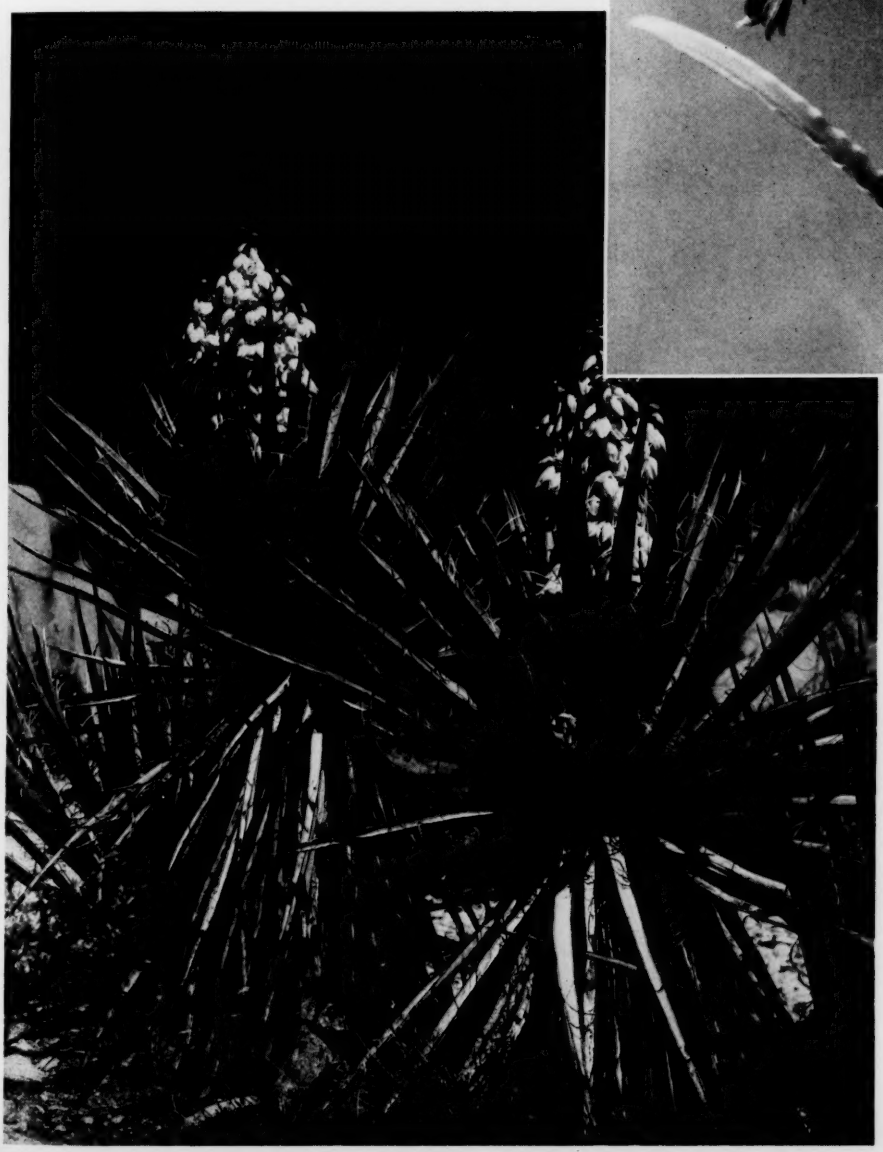
The perennial red Indian paint brush, *Castilleja*, prefers the rocky, mountainous desert areas, usually grows just beneath the outer branches of shrubs, or up through them — good protection.

nor the less easily reached but more bizarre desert of the mid-peninsula of Baja California, known as the Vizcaíno.

For those who would identify the numerous desert flowering herbs, shrubs, and trees a number of good books are available. Among those of popular nature are *Flowers of the Southwest Deserts,* published by the Southwestern Monuments Association and the author's *Desert Wild Flowers,* published by the Stanford University Press. Two very readable works entitled *Arizona Cacti* and *A Manual of Southwestern Trees and Shrubs* are published by the University of Arizona. Books for the technically trained reader are Kearney and Peeble's *Arizona Flora, A Manual of Southern California Botany* by Philip A. Munz, and *A Manual of the Flowering Plants of California* by Willis L. Jepson. All of these books carry numerous illustrations. END

One of the strangest members of the mustard family is the squaw-cabbage, *Caulanthus inflatus.* It often occurs in broad fields, its numerous greenish-yellow, hollow stems looking like purple-jeweled stakes driven into the sand. Both Indians and pioneers used it as a potherb.

A favorite, always, with flower lovers is the desert lily, *Hesperocallis undulata.* The generic name, compounded of Greek stems, means evening beauty. The specific *undulata* refers to the long wavy-margined leaves. The deep-buried bulbs often retain their full vigor several years while waiting for penetrating rains to encourage growth. Especially fine displays of this handsome day-lily are to be found in some of the broad desert basins of the eastern part of the Joshua Tree National Monument. There, during favorable seasons, I have seen thousands upon thousands of plants thickly populating hundreds of acres of the loose sands. This is the Ajo (garlic) lily of the Spanish settlers.



The Mohave yucca, or Spanish bayonet, *Yucca schidigera,* is perhaps the hardiest and one of the most widespread of our Southwest desert shrubs, and to the Indians one of the most useful.
Its fibers were the best they could get for making cordage, moccasins, and coarse cloth; its fruits and flowers gave them food; from its roots they could extract needed soap and dyes.
This is a low-growing yucca with yellowish-green dagger-like leaves up to a yard long. The specific name *schidigera* is a compound of Greek words and means splinter-bearing — from the leaf edges project long coarse fibers that look a good deal like thready splinters.

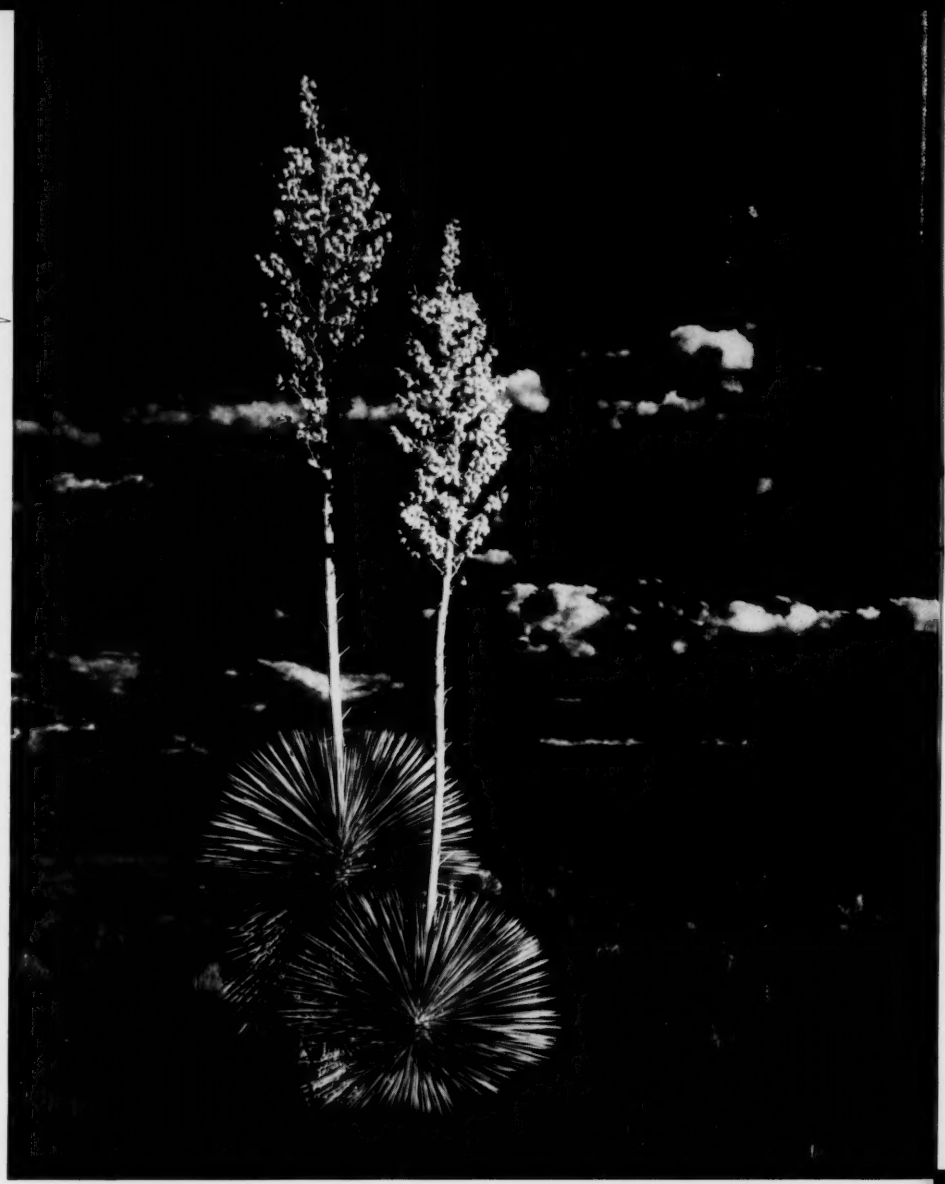
Yucca, desert, and moonlight.

Lilies that Bloom in Deserts

DOLORES B. JEFFORDS

presents a group of photographs by

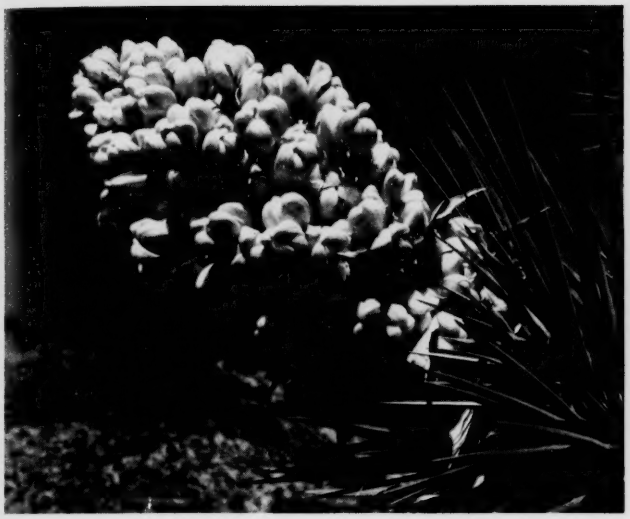
JOSEF MUENCH



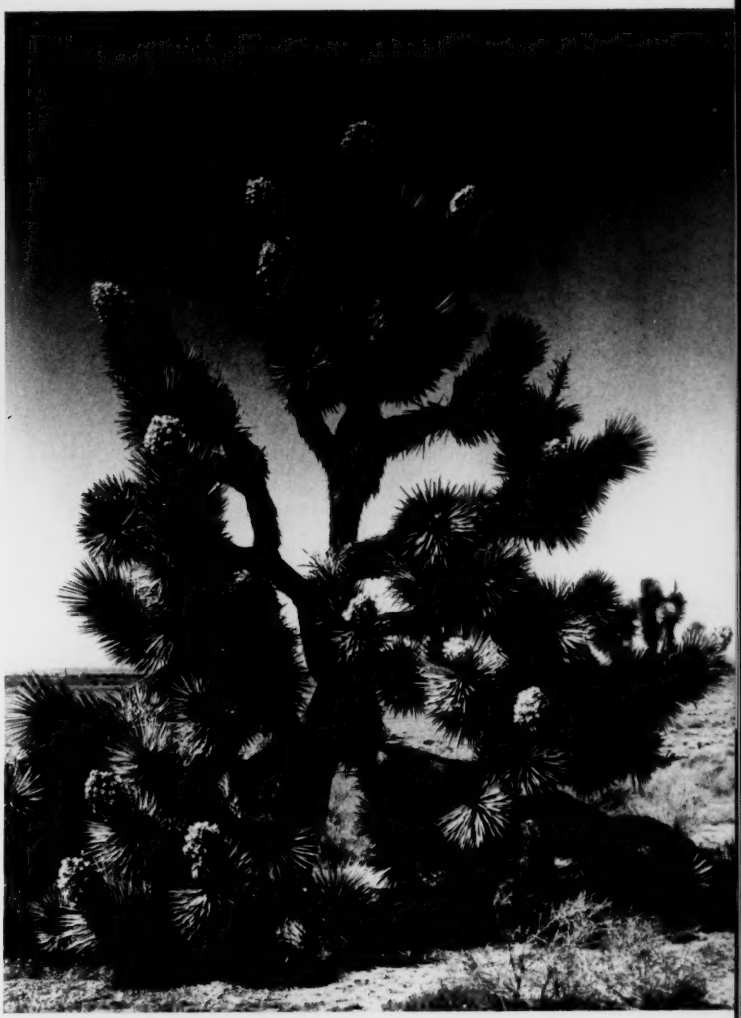
NO DESERT FLOWER excels the yucca in spectacular beauty – especially California's chaparral yucca. In full bloom this plant of the desert's edge and the dry chaparral foothills of the southern Sierra and inner South Coast Ranges justifies the name given it by early Spanish explorers and settlers in the Southwest – "Our Lord's Candle." They do suggest gigantic white-flamed candles – the eight- to fourteen-foot stalks with their upper halves plumy panicles of creamy white and very fragrant blossoms radiant in clear sunlight. Only at night are the flowers fully open, and in moonlight they have an ethereal luminescence – no wonder they arouse poetic and mystic feelings.

YUCCAS live, bloom, and bear seeds because of a tiny moth. This is a strange relationship, and ancient – for each yucca species there is a species of moth of the genus *Pronuba*. Yucca flowers cannot pollinate themselves, and Pronuba larvae must eat yucca seeds. "The female Pronuba works by night, collecting the pollen from the anthers and rolling it into a little ball; she then flies to the flower of another plant, deposits her egg in the ovary, and then in a manner which corresponds to actions full of purpose and deliberation climbs to the style and thrusts the pollen ball down the stigmatic tube. The larva destroys about a dozen seeds, but even if several larvae develop many perfect seeds are left" (Willis Linn Jepson, *Manual of the Flowering Plants of California).* Indians, too, made good use of yuccas – they ate the buds, flowers, fruits, and young flower stalks, and made a fermented drink from the fruit; they made baskets, mats, cloth, rope and sandals of the fiber, and soap of the roots.

Blossoms of *Yucca Whipplei.*



← Joshua blossoms never fully open.



→ Joshua tree in bloom *(Yucca brevifolia)*.

THE JOSHUA tree is one of the most curious and interesting sights of the Southwest, especially where it grows in forests in the Mohave Desert – its chief habitat – and in southern Nevada, southwestern Utah, and northwestern Arizona. In California, the Joshua Tree National Monument was set aside to preserve the finest of these weird tree-yucca forests. Hardly fitting our concept of a lily, this grotesque tree reaches a height of 40 feet – one, now dead, was reputed to be 75 feet tall! – and a few have trunks 3.5 feet in diameter. The usual height is 30-35 feet, but the many branches and dense tufts of dark spiny leaves make Joshuas dominant objects in the desert scene. In April or May – not every year but when conditions are right – heavy clusters of greenish-white buds develop, never fully opening. A Joshua is home to birds, insects, and several kinds of small desert animals.

THE WHITE MAN, too, has found many uses for the yuccas. Souvenirs and curios made from them are displayed throughout the Southwest. Yucca wood makes thin, strong, pliable covers, beautifully grained, for snapshot albums. It provides a cylindrical sheathing to protect the bases of fruit trees from gnawing animals, and makes excellent wrap-around splints for surgical uses, since it can be peeled off the trunk in sheets. It has even been used in the manufacture of artificial limbs, and has been experimented with as a possible source of paper pulp. But such uses should not be encouraged to the point of threatening any one of the many interesting yuccas, which contribute so much to the beauty of our Southwest.

Desert road through Joshuas.

HAROLD O. WEIGHT

VALLEY OF FABLED DEATH

IF YOU DOUBT THAT DEATH VALLEY has a universal reputation as the super-ultimate of heat, danger and desolation, plan an excursion there in mid-summer. When my wife and I determined to see the valley at its worst, we were very nearly overwhelmed by the warnings and the worryings of our friends. Our protestations that any desert is reasonably safe in summer, if proper precautions are taken, and that any desert is deadly if they are not, were disputed. This was Death Valley!

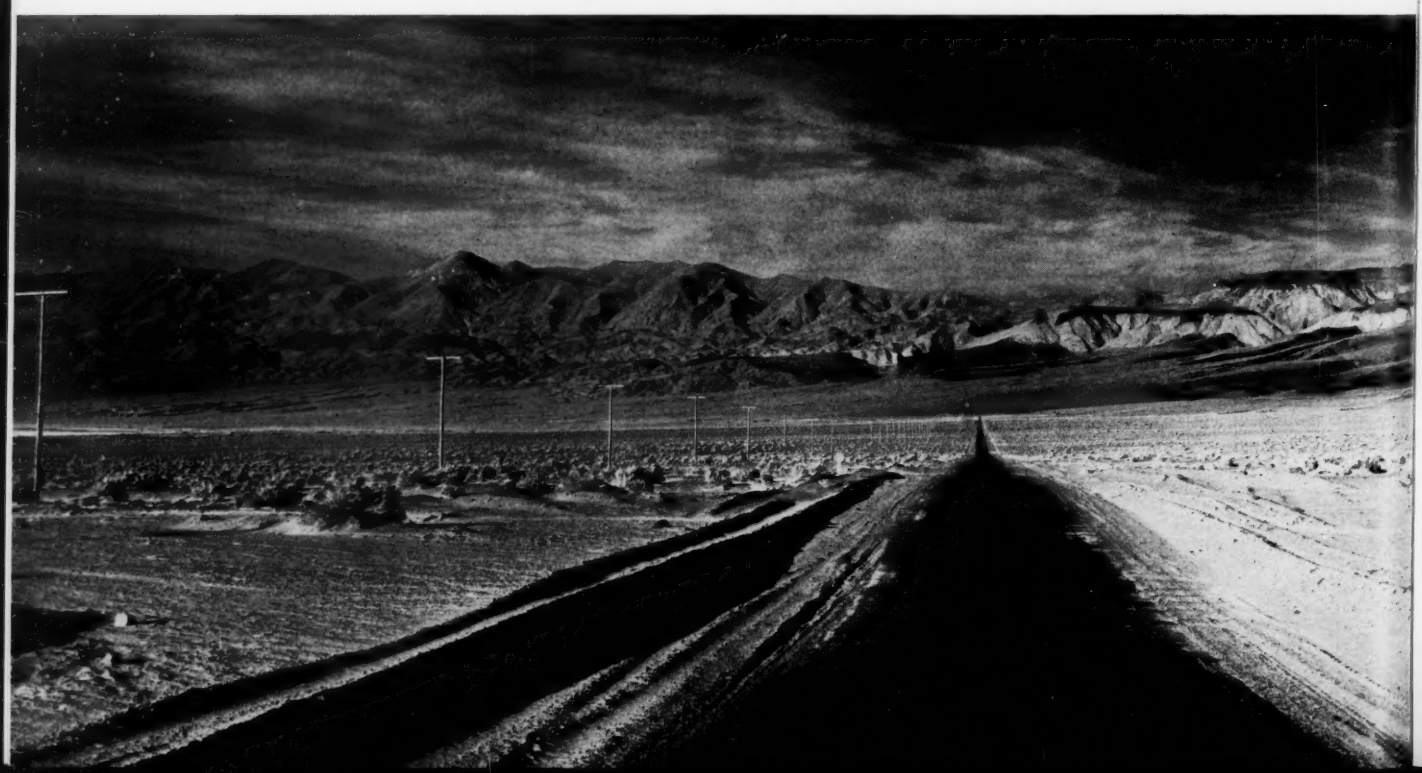
The final admonition was pronounced by a man who had lived in the area: "If you should get stuck on the floor of the valley in the summer, it's a good idea not to sleep on the ground. The old story was that on the ground or under a bush poison gas would kill you. There's no poison air in Death Valley—it's lack of oxygen that's fatal. Hot air rises and if you're down on that closed-in valley floor where fresh air can't replace it, there's going to be a dead spot. Get up on something—like your car—and you'll get a little air."

Of course that warning was in my mind a few nights later when we went to bed far below sea level—and on the ground—in the sink of Death Valley. It was an uncomfortable night, but mosquitos, not poison gases or vacuums, were responsible. They drove us into sleeping bags intended for higher altitudes, where we sweltered until morning. And those same mosquitos proved to be the most unpleasant features of four mid-July days at various elevations in Death Valley National Monument. Daytime temperatures were bad, but seemed no worse than the summer heat in Imperial Valley and southern Arizona.

I hadn't really expected to find a vacuum at the bottom of Death Valley—but it was something to think about. And as the mosquitos kept me awake that first night, I thought of all the wonderful tales about the Big Sink that I had read and heard. And I came to realize that if it had not been for the misadventures of a few dozen stubborn and geography-ignorant emigrants in 1849, the Death Valley we know today might not even exist.

For our Death Valley is more than a geologic spectacle, beautiful with the severe and awesome beauty that only the naked elements of world-building can attain. And it is more than the physical actuality of the great sink—remote, silent, bone-white and ash-gray—which curls between the vast alluvial fans of the Panamint Mountains and the burned and ravaged rocks, the sheer fault scarps, of the Blacks and the Funerals.

In the past hundred years it has become an embodiment of man's compulsion to create and believe in lands of mystery, dread, and wonder. It remained, far into our own century, a dazzling, frightening last hope for adventurers and dreamers born too late to seek El Dorado or the Cities of Cíbola. We cannot enter it or think about it, even today, but that our perceptions and thoughts are colored by generations of sensational tales and campfire fancies.



This fabled land, which is coexistent with the physical Death Valley, began on that December day in 1849 when members of an emigrant company who had gambled on a short cut to the California gold fields brought their heavy wagons down sandy Furnace Creek wash onto the floor of the valley and despairingly faced the great barrier of the Panamints. They had parted from the Sand Walking Company near Mountain Meadows, Utah, because they were dissatisfied with the guidance of that group by Captain Jefferson Hunt. But Hunt took those who followed him safely through from Salt Lake City to San Bernardino, while the Jayhawkers, the Bennett-Arcane party, the Briers, the Wades, and the Georgians stumbled into Death Valley.

Today there is debate as to whether these emigrants—and if so, which of them—actually applied the name Death Valley to the Big Sink. That matters little. It was named because of their experiences, and they originated and spread the tale of its horror. The curious thing about it is that Death Valley dealt far more gently with them than might have been expected or than they deserved in the face of their foolhardy determination to press due west, no matter how many mountains barred the way.

The emigrants finally realized the magnitude of their error and abandoned their wagons in Death Valley. But only one of them definitely is known to have died there, while at least three perished on the grim march across the rest of the Mohave Desert where their greatest sufferings occurred before they reached safety near San Fernando. How reasonable Death Valley was about the whole matter may be shown by its treatment

↑ The great trough of Death Valley, looking north from Dante's View in the Black Mountains. Believed older than the Grand Canyon, the below-sea-level sink was formed by folding and faulting of the earth's crust. The entire length of Death Valley is about 140 miles.
← The Olancha Cutoff is only one of a number of good access roads to the valley — from every direction now except north. This road crosses the Argus Range and the Panamints.

of the Wade family. The Wades turned south instead of bucking the Panamints, following Death Valley to its southern end where they found water at Saratoga Springs. Then they swung southeastward to the sink of the Mohave, rejoined the Old Spanish Trail, and made it safely into San Bernardino. There is some question whether they walked or drove, but there is no question but what they and all the others could have driven out this way.

As the Death Valley Fortyniners reached California in scattered groups, they did not know how many had died in the valley, but they were sure the number was large. Soon the distorted story pictured 68 out of 70 perishing in the ghastly, unearthly sink. There was an eyewitness account of men, women, oxen and wagons breaking through the crust and becoming encased in crystallized salt. Whole parties, it was reported, had fallen dead in a single day. No one could live in Death Valley. Nothing could live in Death Valley. And at that very moment, Panamint Indians who habitually wintered in the valley were fingering the equipment abandoned by the emigrants, and wondering.

Oddly enough, the first emigrants added the only other ingredient necessary to make Death Valley fabulous and immortal. On the way out, probably in the Panamints, one of them picked up a piece of native silver and later had it fashioned into a sight for his rifle. The farther the emigrants got from Death Valley, the worse were its remembered terrors and the bigger its silver ledge. The first expeditions into the valley after the Fortyniners searched vainly for that ledge. Later a man named Breyfogle, probably hunting the Lost Gunsight, found and lost an even richer gold ledge. Then men had both gold and silver to seek in a valley which, by now, had poison gas for its air and poison springs for its water.

Some of the lost mine hunters made good strikes around the edges of the Big Sink and Panamint, Keane-Wonder, Bullfrog, Rhyolite and Skidoo boomed and brought hordes of eager, inexperienced men into the wasteland. Then Death Valley earned its name, for they insisted on tackling the valley itself. The only successful mining there was borax—from the cottonballs in the sink in the 1880's and later from beds near Ryan.

Bad Water, sink of the Western Hemisphere, is 279.8 feet below sea level (arrow, upper right, points to sea-level marker). This greasy, alkaline pool is the last up-seep of the Amargosa River which rises to the northeast, in Nevada, flows south, then west around the lower end of the Black Mountains, then north, completing three fourths of a circle. The volcanic Black Mountains, background, rise almost vertically from this point to Dante's View.

Above the bed of Furnace Creek rise hills of highly soluble clay, which could stand any length of time only where rainfall is less than one inch a year. Fortyniners came this way; today California Highway 190 follows this route into Death Valley.

But the greenhorns based their hopes on pictures painted by writers such as Arthur J. Burdick who, in 1904, proclaimed in his *Mystic Mid-Region:* "There are in the valley golden ledges, the ores of which run in value to fabulous sums per ton. There are vast beds of borax, niter, soda, salt, and other mineral drugs . . . Turquoises, opals, garnets, onyx, marbles, and other gems and rocks of value exist in abundance. The valley is a storehouse of wealth, the treasure-vault of the nation, the drugstore of the universe, but Death holds the title."

This period, which bred grave mounds along Death Valley trails, also saw the rise of many now-familiar fables. Prospectors reasoned them out from effect to cause. There must be poison gas in the sink because too many men who crawled into the shade of bushes died. But reported recent investigations showed that ground sunlight temperatures might reach 180° F. at the same time they would be 125° F. at five feet off the ground.

Men were found dead with their canteens nearly full, and two reasons were advanced. The water became too hot to drink or moisture evaporated from the body faster than it could be replaced. Today we may suspect that these men died from loss of salt. It was said that a man without water in Death Valley would go insane in an hour. I have survived longer than that with no ill effects, but I have suffered heat prostration in fifteen minutes, through careless exposure, and perhaps that is what they meant.

Other stories are not so easily explained. Death Valley does have the highest official temperature on record in the Western Hemisphere—134° F. on July 10, 1913—and that was in the shade and not in the hottest area. But much greater heats would not split skulls open. And while you might be washed down into Death Valley by a cloudburst, you need have no fear of being carried out of it by the once dreaded "water spouts." While you may be chilled and blown about by a winter wind on Dante's View, you won't be incinerated by the summer "furnace winds" which once swept through writers' imaginations.

Nor does Death Valley need the sauce of such unsubstantial terrors. Its real self is superlative piled upon superlative. Its story, being slowly patched together by geologist, geographer, and all manner of researchers, outreaches the tallest tale of the tallest teller. Levi F. Noble, studying the area many years for the U. S. Geological Survey, has stated that rocks of all the great divisions from Archean through Quaternary may be found in the Death Valley region. Had they been left in their proper sequence they would have a total thickness of 40,000 feet.

But they have been so disturbed, so shattered, so tossed about that Dr. Noble, seeking a name for one division, could only call it Chaos. Somewhere around the Tertiary, the Age of Mammals, the relatively normal development of land forms in the Death Valley region was interrupted by a cataclysmic compression of the earth's surface, when strata were thrust into one another like shuffled playing cards. At least three of these tremendous layers were rammed so far to the west that, according to one authority, the surface of the earth was shortened 50 to 75 miles. Dr. Noble termed this the Amargosa Overthrust, and the surface of incredibly broken up bits of rock masses of various ages which it created, he named the Amargosa Chaos.

A few geological moments later, the earth's crust was squeezed again, and it humped itself into ridges and sank into hollows—anticlines and synclines—and Death Valley was born. The valley was a syncline whose down-warping and faulting has carried its trough below sea level. Its western wall was formed by the tilted block of the Panamints, its eastern by the sheer, fresh scarp of the Black Mountains, a major fault along which the valley trough sank. To this rough-shaping of the Big Sink, which further complicated its geological pattern, erosion, vulcanism and earth movements added their touches.

And there were deep, nearly fresh lakes in the great trough, particularly in glacial times. For a considerable period the eastern drainage of the Sierra Nevada reached Death Valley through the last of a series of lakes which, when full, overflowed through Wingate Pass. The Mohave River and Amargosa, it is believed, entered the valley through its southern end.

The largest of the Death Valley lakes, Lake Manly, was at least 90 miles long, up to 11 miles wide and about 600 feet deep. As climatic conditions changed, one body of water would evaporate completely to a salt bed, then another would form, laying down a clay deposit. These alternating layers—the ghosts of lakes—have been traced to considerable depth. Salt beds, it has been claimed, have been drilled at 1,800 feet down.

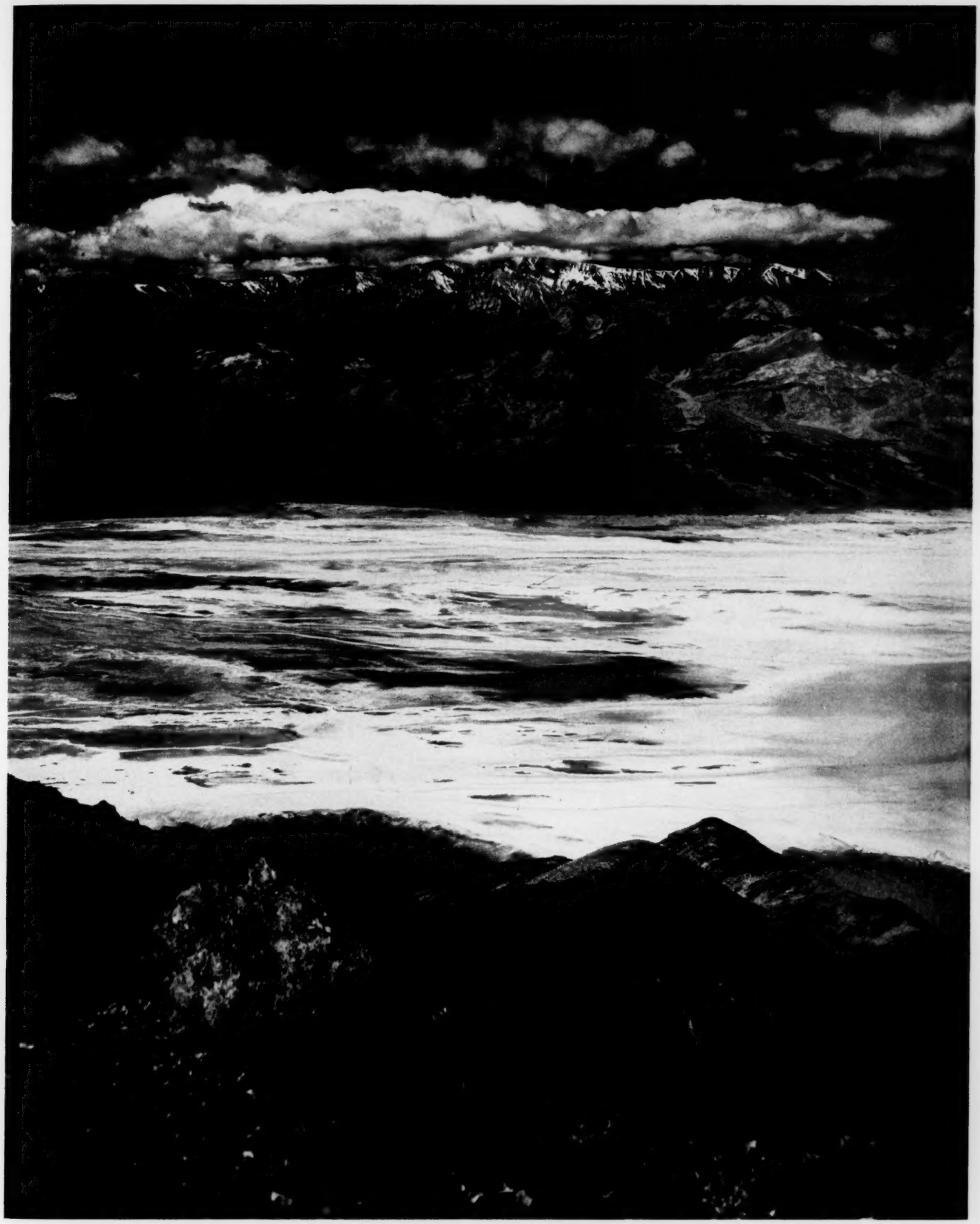
When the last lake became a salty desolation, and the desertness of the land increased, Death Valley was ready for its first visitors. It is little wonder they found it strange and fear-inspiring. It was not for human beings, they said. That is one thing upon which writers, until recent decades, agreed. Other deserts might be tamed, but not Death Valley. Except for scattered adventurers, men would never come there.

In 1933, Death Valley National Monument was created, and in the few years since, we have seen its miraculous transformation from shunned wasteland to winter playground. In the summer, of course, the luxury hotels close, the swimming pools are empty—and Death Valley is Death Valley.

Probably it will remain that way. We have no intention of visiting it in midsummer again. It was too hazy for photography and too hot to hike. Of course we also found that the heat was endurable and that we wouldn't be asphyxiated on the valley floor. But that has been proven before and it has not appreciably altered the popular conception of the Big Sink, nor shaken any of the legends about it.

That may be as well. Fabulous Death Valley may sharpen the appreciation of the reality. Certainly it cannot detract from the true superlatives: the great wind-patterned sand dunes as they become light and shadow; the frozen sea of salt leveling the sink bottom; the majestic upflung battlements of the Panamints; the volcanic turmoil of mountains on the east; the vivid erosion-patterned chemical clays of Zabriskie Point and Artists Drive and Golden and Mustard and Mosaic canyons.

And what of Dante's View, the supreme panorama from the eastern rim, on the right morning when there is snow on Telescope Peak and cloud shadows on the streaked and whorled salt flats far below and the jumbled clay hills and naked rock glow with their pastels? I myself, for myself, could not say how much of the compelling power of that vision is due to what I see and how much to the film of legend through which I see it. END



Death Valley's supreme panorama — looking westward from Dante's View, more than 5,000 feet above sea level on the crest of the Black Mountains, across America's great sink, the lowest point of which lies in the salt flats below. The fan-shaped area at the near edge of the flats is a talus slope. The Panamints, on the other side of the valley, rise to 11,045 feet at Telescope Peak, whose top is hidden in clouds at the center of the view.

THOMAS H. KEARNEY

Ira L. Wiggins

EARLY MORNING VISITORS admiring the exhibits in the west wing of the California Academy of Sciences may often have seen a tall, quiet man walk briskly down the long hallway and enter the door leading to the research laboratories. Very few of them would know that this courteous gentleman has a long record of distinguished service as a botanist in the U. S. Department of Agriculture – that behind this spare, modest man is a scientific career that includes field work from the Alaskan and Siberian Arctic to the hot, dry parts of Mexico and the deserts of North Africa; association with outstanding fellow scientists and public figures through half a century; research projects running from the ecological factors operative in the Great Dismal Swamp of Virginia and North Carolina to the relationship between cultivated and wild cotton plants and to the classification of the native plants in the state of Arizona. Such varied interests, personalities, and projects constitute a part of the history of botany and agriculture with which Thomas H. Kearney has been closely associated for about sixty years.

One learns from *Who's Who in America* that Dr. Kearney was born in Cincinnati, Ohio, and entered the University of Tennessee at the age of fifteen. After only two years there he became assistant botanist at the Tennessee Agricultural Experiment Station, where he remained only one year before moving on to Columbia University for additional specialized training in botany. While there, and a student at the same time, he served as assistant curator of the herbarium.

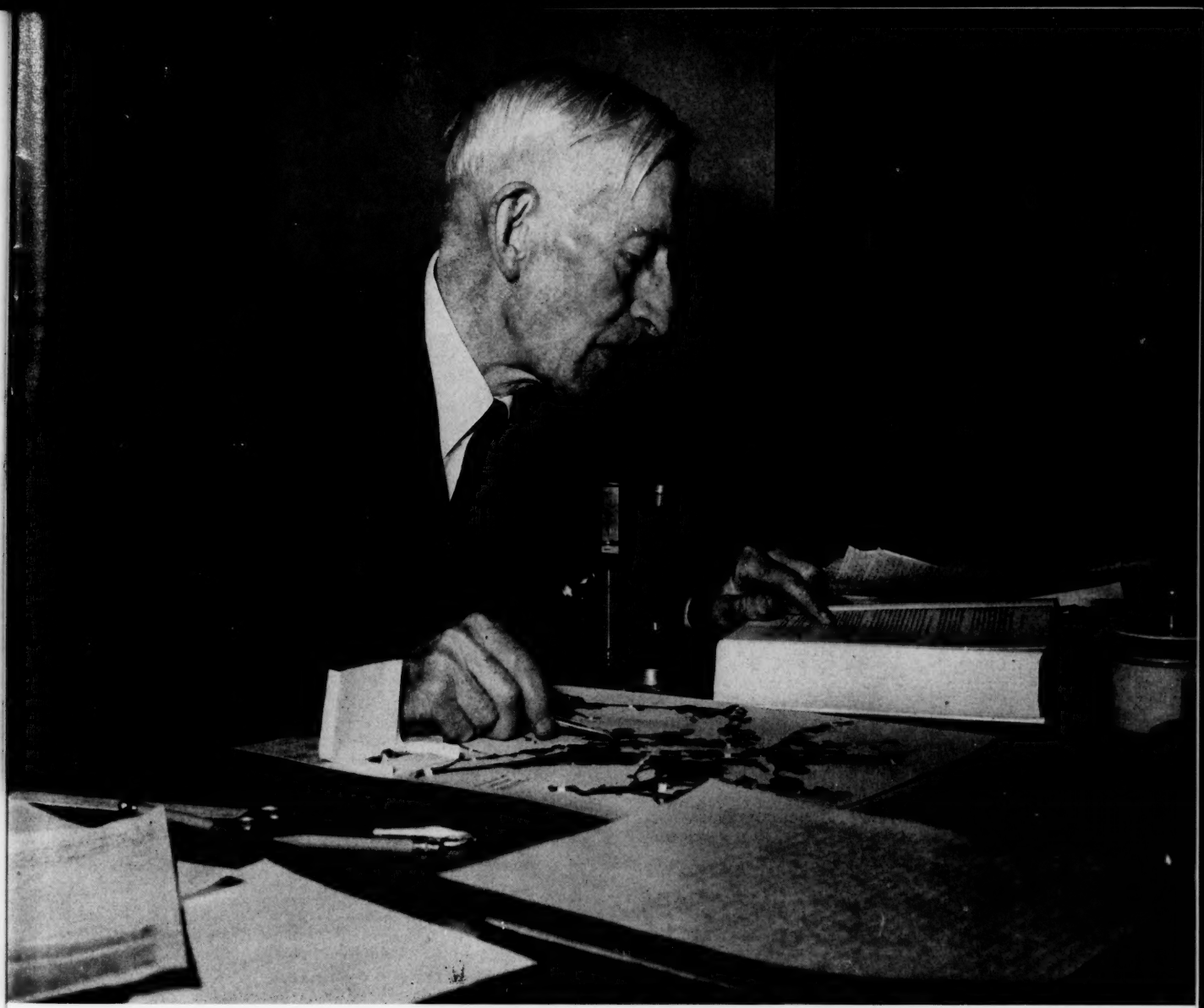
Condensed into the five short lines following the *Who's Who* entry that records the Columbia appointment is a series of dates and changing titles covering his varying assignments within the Bureau of Plant Industry of the U. S. Department of Agriculture. These unilluminating data end with "principal physiologist, 1929-44 (retired June 30, 1944)." Those five lines fail utterly to give the slightest inkling of the interesting experiences those years held for Thomas H. Kearney. Nor can one find a written account of the years and ventures that saw his rise from "assistant agrostologist" in 1894 to "principal physiologist, retired" fifty years later. One must read between the lines in reports, scientific papers, and books from his own and others' pens to capture the drama, the scope of achievement, the adventure – and the occasional disappointment – that have marked his career.

During the summer of 1899 he was a junior member of the scientific staff engaged in the Harriman Alaska Expedition. The expedition sailed from Seattle, touching at promising collecting spots along the Inside Passage, tarried at the island of Kodiak (then spelled Kadiak), continued on past the Pribilof Islands to Plover Bay in Siberia, and returned via the Nome Peninsula, where no member of the party dreamed a fabulously rich gold strike had been made the fall before. As botanical assistant to Frederick V. Coville, young Kearney tramped many weary miles over difficult terrain to collect large series of specimens, labored into the early morning hours putting the plants into presses, and developed huge blisters on his hands at the oars of heavily laden, cumbersome dories as he helped to ferry personnel and gear from ship to shore and back to the ship at the end of the day.

The hardships of the summer were offset, fortunately, by the opportunity to associate with and listen to the discussions of some of the famous scientists, authors, and artists of that period. Among these were G. K. Gilbert, John Burroughs, John Muir, William H. Dall, Louis Agassiz Fuertes, Robert Ridgway, C. Hart Merriam, A. K. Fisher, William E. Ritter (then president of the California Academy of Sciences), William H. Brewer, and William Trelease.

After the Harriman Alaska Expedition was ended, Kearney applied himself to the problems facing agriculturists operating in arid regions. The new work – Dr. Kearney recalls this period now as the most exciting of his career – took him twice to North Africa. With Thomas H. Means, then of the Bureau of Soils, he went to Egypt in 1902 to study the cotton industry of the Nile Valley; the knowledge gained enabled him to start the breeding of Egyptian-type cottons in our own Southwest. Two years later he was back in the Mediterranean on another project. In 1904-5, at the suggestion of the late Dr. Walter T. Swingle, he spent a winter in Tunisia and Sicily investigating the culture of date palms and pistachio trees in those countries. Several hundred date offshoots were brought out of the French protectorate for planting in the Coachella Valley of California, and it needed an 80-camel caravan, Dr. Kearney recalls, to convey them to the railhead from the Saharan oases where they had grown.

For a number of years after these overseas missions, he spent a part of nearly every season at the U. S. Department of Agriculture's experiment station at Sacaton, Arizona. There his interests, among others, embraced the improvement of the strains of cotton under cultivation. Following lines of relationships outward from the cultivated cottons, he became familiar with native members of that family in all parts of the world,



Dr. Thomas H. Kearney, at his desk in the herbarium of the California Academy of Sciences, checks a point in his newly revised *Arizona Flora*. (Elmer Moss)

and is a recognized authority in the systematics of the Malvaceae.

The University of Arizona fittingly paid tribute to his work in breeding cotton by conferring on him the degree of Doctor of Laws in 1920.

Dr. Kearney's interest in the native plants of Arizona prompted him to undertake the preparation of a flora of that state. In 1942 an excellent book of 1069 pages entitled *Flowering Plants and Ferns of Arizona* appeared under the joint authorship of Thomas H. Kearney and Robert H. Peebles. Upon his retirement the senior author began a complete revision of the book. It was reorganized throughout and nearly 200 plants were added which had been discovered in Arizona during the comparatively short interim between editions. This new work was issued late last year by the University of California Press as *Arizona Flora,* by Thomas H. Kearney, Robert H. Peebles, and collaborators. The brief mention of it in this issue's Reviews gives but the barest idea of its scope and value to all who work in the field of Southwest plant life. Agriculturists, especially, may not agree with the modest statement in *Who's Who,* "Prin. work, study of the flora of Arizona," but those who use either edition of this fine book will agree it stands high among the principal works of Thomas H. Kearney. END

The desert is a garden

VEGETATION OF THE SONORAN DESERT. By Forrest Shreve, with a Foreword by H. A. Spoehr. Carnegie Institution of Washington, Publication 591, Washington, D.C. 1951. xii + 192 pp., 27 maps, 43 photographs.

This book is the culminating publication resulting from the author's nearly constant study, through some 40 years, of the vegetation growing naturally in the desert areas of Arizona, Sonora, Baja California, and that part of southeastern California known as the Colorado Desert. He made the observations on which the book is largely based throughout the length and breadth of the Sonoran Desert and, to a lesser degree, in the glass houses and gardens of the Carnegie Institution's Desert Laboratory on the outskirts of Tucson, Arizona.

The book contains five chapters; the first outlining the scope of the problem and defining the area under consideration. The second chapter, also brief, deals with the physical factors of terrain, soils, drainage systems, mountain ranges, and climatic factors. Dr. Shreve accorded these factors only cursory treatment, blocking in the general background against which he could describe the characteristics of the vegetation.

The third chapter, 100 pages in length, contains Shreve's proposal that seven vegetational zones be recognized within the confines of the Sonoran Desert. In it he compared and contrasted the features of the Sonoran, Chihuahuan, Mohave, and Great Basin deserts. He discussed the main groupings into which the twenty-five plant life-forms present in the Sonoran Zone could be arranged. A number of lists are given of plants found in each vegetational subdivision and the roles of some of them in characterizing the general physiognomy of the vegetational units. Other lists include plants peculiar to, or dominant in, well defined ecological habitats. They reflect the meticulous care with which Dr. Shreve assembled, weighed, and analyzed his data before drawing general conclusions. These carefully prepared lists should be of considerable value to plant geographers.

Chapter four, dealing with "Ephemeral Herbaceous Vegetation," contains a discussion of the role of this type of plant, in the Sonoran Desert as a whole, and within each of the different geographical and vegetational subdivisions of the area. The author included a discussion of the geographical distribution of these annuals outside the Sonoran Desert, and suggested probable and possible relationships between the annual flora of the Sonoran Desert and those of more distant regions. Since the seasonal distribution of the rainfall changes as one travels from north to south in the Sonoran Desert, favoring winter ephemerals in some areas and summer ephemerals in others, Shreve dealt with the two groups of annuals separately.

In the fifth and final chapters Shreve presented a detailed treatment of the ecological relationships of twenty-seven species characteristic of the Sonoran Desert. Maps show the distribution of 13 of these 27 species and of eleven other species not described in the text. The 37 plates, containing 43 half-tones made from photographs taken by Dr. Shreve, present an excellent picture of the general appearance of the Sonoran Desert and of the vegetation it supports.

The index is more complete than often is the case in books dealing with a large number of terms, species, concepts and places.

The format and printing follow a high standard. The half-tone plates are good and the maps are accurately executed. It is very regrettable that Forrest Shreve's death on July 19, 1950, deprived him of the satisfaction of seeing the book through the press. It is one that contains far more information about the vegetation of the Sonoran Desert than one might expect to find in its slightly less than 200 pages.

IRA L. WIGGINS
Natural History Museum
Stanford University

ARIZONA FLORA. By Thomas H. Kearney, Robert H. Peebles, and collaborators. University of California Press, Berkeley and Los Angeles. 1951. viii + 1032 pp., frontis. in color, 45 habitat and plant photographs, map. $7.50.

As Ira L. Wiggins pointed out in his biographical sketch of the senior author, in this issue, *Arizona Flora* is not just a new edition of Kearney and Peebles' *Flowering Plants and Ferns of Arizona*, but essentially a new work. The *Flora* proper (Part Two) is quite technical, of course. For anyone generally interested in natural history of Arizona, the photographs are highly instructive. Part One, The Physical Background and Vegetation of Arizona, describes briefly the topography, geology and soils, climate, vegetation in relation to physical conditions, and life forms. A short Introduction summarizes botanical exploration.

FLOWERS OF THE SOUTHWEST DESERTS. By Natt N. Dodge. Drawings by Jeanne R. Janish. Southwestern Monuments Association, Popular Series No. 4, Santa Fe, New Mexico. 1951. 112 pp., profusely illust. Paper. $1.00.

FLOWERS OF THE SOUTHWEST MESAS. By Pauline M. Patraw. Drawings by Jeanne R. Janish. Southwestern Monuments Association, Popular Series No. 5, Santa Fe, New Mexico. 1951. 112 pp., profusely illust. Paper. $1.00.

For their respective habitats these two handbooks exactly fill the need for lightweight ready-reference, *fully* and competently illustrated, non-technical, to take with you on desert excursions.

EDITOR'S END PAPERS

A year and a spring

THE DESERT YEAR. By Joseph Wood Krutch. William Sloane Associates, Inc., New York. 1952. 270 pp., drawings by Rudolf Freund. $3.75.

This issue of *PD* may be your introduction to the desert or you may have lived there all your life. In either case—if your bent is to look beyond facts to meanings, to seek the why of what you see as Dr. Ross has suggested in the opening article—Professor Krutch has just written a book for you.

Every year the desert bewitches an unrecorded number of visitors to the Southwest. When Joseph Wood Krutch went under the spell, *The Desert Year* was the happily inevitable outcome. The first strike, twelve years ago, was edgewise, touch and go, but the desert had him as if by a spring, pulling him back from Connecticut every year for the next three, "irresistibly across the twenty-five hundred miles between my own home and this world which would have been alien had it not almost seemed that I had known and loved it in some previous existence." (This traumatism

is diagnostic.) His fifth visit followed the war. This did it – he knew now he must live for a time in the desert to learn the secret of its hold. A sabbatical leave and a vacant house "in the very middle of a stretch of Lower Sonoran Desert" joined to make the sixth not a visit but a residence – the place, near Tucson, he locates by indirection. So *The Desert Year* was begun.

It is in no sense a diary or log of events that Dr. Krutch has put down, nor has he repeated the calendary form of *The Twelve Seasons.* Rather, the present book came naturally out of Dr. Krutch's approach to the desert – more accurately, perhaps, the desert's approach to Dr. Krutch. He went with mind and heart open, let come what may, and as the desert in all its varied aspects entered in he recorded what he saw, heard, felt, and thought in a way that puts the reader right beside him under a giant saguaro, at the edge of a rain pool, or upon a mountaintop. The companion he speaks of is you, too. However personal his "Why I Came," you know it is also why you came. You and the author together discover "What It Looks Like," "How to See It," "How Some Others Live There" – it is no conscious method or literary trick but an empathic relationship born of the author's identity with the inquiring, pondering you.

With a scientist's curiosity and a philosopher's humor, Dr. Krutch considers such matters as the desert's differentness from New England or the jungle; adaptation – "a cold word. . . Let us say rather that (desert plants and animals) all have shown courage and ingenuity in making the best of the world as they found it . . . a very good best"; space– the desert "simply will not support either too many people or too many mesquite trees. Hence we both have room" . . . which "is becoming one of the scarcest things on earth for most people because it is one of the things which no economy of abundance seems to plan to supply abundantly."

The miracle of a myriad chorus of spadefoot toads from a fleeting pool after "Desert Rain" brings out some gentle gibes at laboratory biologists – "the odor which clings to these scientists is too seldom that of the open air, too often that biologist's odor of sanctity, formaldehyde" – because they could so easily tell him the difference between *Scaphiopus couchii* and *Scaphiopus hammondi* while admitting that "very little is known about the lives of either . . ."

"From a Mountaintop" Dr. Krutch gets perspective on man, trying to see him in context, and aims a few potshots at the materialists–they would hardly agree that "consciousness is the grandest of all facts." He is certain man will find the key to a better life, if he ever does, in nature and in himself regarded as part of nature, not in formulas nor in machines. (Do not judge from this that Dr. Krutch is any shallow nature-mystic.)

It is impossible here even to hint at all the things this wise and humble man learned about the desert, about himself, and about all men, from his desert year. You must read the book, with pleasure and profit, for such of these matters as Dr. Krutch invites you to share with him.

A reviewer may admit his biases. The desert is our favorite if necessarily seldom lived-in habitat. The philosophical slant on the natural world makes our favorite kind of reading. With *The Twelve Seasons* Joseph Wood Krutch became one of our favorite authors, along with William Beebe, Donald Culross Peattie, Aldo Leopold, John Muir, and others of a small company. They began as naturalists who developed rare gifts of interpretative style, while he is a philosopher and man of letters whom nature wooed late but solidly; yet Dr. Krutch belongs assuredly in *Great American Nature Writing* (to ring in the title of his own anthology of moderns from Thoreau and Muir to Peattie and William Morton Wheeler whose works define a genre), despite his excuse for including in it a selection from *The Twelve Seasons.* This we like: "The present compiler's immodesty," says Dr. Krutch, "is no doubt too patent to admit apology. He is simply unwilling to miss what may be his only chance to be included in an anthology of nature writers." Certainly no new anthology of this kind will be properly representative without something out of *The Twelve Seasons* or *The Desert Year.*

To return to the latter, it is an experience to let soak in, like desert sunshine, it is a book you'll find yourself pulled back to, randomly, after you've read it through. You will have discovered very quickly, the first time, that it is not just another book about the desert. If you are a desert lover and already have Pickwell and Jaeger and Corle and Austin and a few of the specialized works on your shelf, you still need Krutch. You may know the desert better than any of them; the factual matter so unpedantically part of *The Desert Year* may all be merest commonplace to you – what matters is that, Dr. Krutch's bent being what it is, he can teach you some fresh ways of thinking besides – most important – how to enjoy what you may merely know.

This book, unlike a text, did not have to be illustrated – but let us pray for more books of either kind illustrated with the technical skill and sheer artistry combined of Rudolf Freund and the very few others in his class.

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Preserving bishop pines

DEAR MR. HOWELL:

Am grateful to you for the article "California's Bishop Pines" in (January-February) *Pacific Discovery*—in fact so much so I am sending Mrs. Livermore another modest contribution toward the Jepson Grove. Sincerely,

C. M. GOETHE

Sacramento, 29 January 1952

MY DEAR MR. HOWELL:

Mr. Livermore and I have just returned from a two weeks' vacation down at Furnace Creek Inn in Death Valley and find among our accumulated magazines and mail the *Pacific Discovery* issue of January-February and I am sure you realize how delighted I am over your excellent article about "California's Bishop Pines."

The photographs are unusually beautiful, and your article most instructive and interesting. Then as a result of this article, Mr. Livermore brought home tonight the check from Mr. Goethe who has told me of his great interest in the bishop pines, and hoped to send an additional check later.

I am very grateful for your mention of the Marin Conservation League and its effort to raise money for a memorial to Willis Linn Jepson, who as you stated was so interested in the bishop pines. We have raised over $6,000, but . . . we really need nearer $12,000 than $10,000. . . . With deepest appreciation of all your help. Sincerely,

CAROLINE S. (MRS. NORMAN B.) LIVERMORE
Marin Conservation League *President*
Box 524, Ross, California, 8 February 1952

Although it did not appear under PD's *Conservation department heading, the article "California's Bishop Pines" by John Thomas Howell, Curator of Botany in the Academy, was conservation-inspired. The author of* Marin Flora *is naturally devoted to the preservation of native plants and their habitats in that unique county north of the Golden Gate, on the botany of which he is a recognized authority. Mr. Howell very gladly consented to write the copy to go with Woody Williams' splendid photographs. Our photographic contributor also has a long-standing interest in keeping his home territory green with these beautiful pines — they grow virtually in his back yard, in Inverness, where their forest begins along the Tomales Bay beaches. Woody had done a pictorial feature on the Jepson Memorial State Park for the* Marin Independent-Journal, *which proved a great asset to the fund-raising campaign; at the same time he offered* PD *another beautiful and telling set of the bishop pine photographs. It is pleasing to all concerned that many substantial contributions resulted — and will quite surely still result — directly from what appeared in the two publications.*—EDITOR

NORTH WITH THE SPRING. By Edwin Way Teale. Dodd, Mead & Company, New York. 1951. xviii + 366 pp., 35 photographs. $5.00.

If this entrancing book were merely "a naturalist's record of a 17,000-mile journey with the North American spring illustrated with photographs by the author" as the title-page legend states, a simple, objective report would suffice. Logically, this would begin with the idea behind *North With the Spring*, a Long Island couple's dream "of leaving winter behind, of meeting spring under far-southern skies, of following its triumphal pilgrimage up the map with flowers all the way, with singing birds and soft air, green grass and trees new-clothed, of coming north with the spring . . . a dream of the winter-weary." It would go quickly on from their nearly ten years of both dreaming and planning, through and after World War II, to a certain February 14 when Edwin and Nellie Teale left Long Island "hard with frost" and hurried south on Highway One.

"Our plan was to start where spring begins for the North American continent, somewhere south of Lake Okeechobee in the no man's land of the seasons, the Everglades. There, amid the sawgrass seas and hammocks, under the high, cloud-filled sky of southern Florida, spring gathers its forces. . . Working north, we would keep pace with its progress, zigzagging by car behind its advancing front, . . . swing wide along the Gulf to the Louisiana marshes, cut back to the Okefenokee Swamp, then trail the season through the Great Smokies, across the Piedmont Plateau, among the Jersey pine barrens, out to the tip of Cape Cod and through the mountains of New England to the green boundary of the Canadian line."

The review would clothe this bare outline of the trip with detail here and there, pinning on some of the curious and wonderful places and things of the trip itself — the floating islands; Wakulla, "largest and deepest spring on the face of the earth . . . a sight so prodigious that you gaze at it hour after hour with undiminished interest"; Tennessee's Nickajack Cave with its underground river; insect-eating plants of Cape Fear; the mysterious lake in the heart of the Great Dismal Swamp — to illustrate the fact that it is a book packed to a remarkable degree with facts of nature and geography.

It is rewarding enough to read this book for a richly detailed, wide-ranging part of the never ending, incomparably fascinating, incredibly varying panorama of nature in our own land. Its validity is assured; the author is a broad-gauge naturalist of established reputation and a top-flight photographer, and he need bow to no one as expert in this kind of writing.

But this reviewer, as may not have escaped notice, is apt to take slants, look for angles. *North With the Spring* was filled with nostalgia for things remembered, regret for things missed. In eleven years on the East Coast we could not more than scratch the surface of natural beauty and wonder, but we did gain one thing, a becoming touch of humility. With this went the resolve never to sell the East short on the score of its natural endowments. Edwin Way Teale's book is recommended medicine for all Westerners who think they have a corner on nature's supreme creations. He more than confirms what we learned in those transcontinental years — there are more differences in kind than in degree, and the only fair and sane attitude is that of appreciating and enjoying to the utmost every aspect of nature, wherever one may be. There is nothing like Grand Canyon, of course; there is nothing like the Great Smokies, either — they are the "home of the richest flora and the most luxuriant deciduous forests on the North American continent." To each its own. D.G.K.

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Burton M. Oliver

Supervisor of the Thrift, Conservation, and School Savings Section, Los Angeles City Board of Education, evaluates the Audubon Camp of California.

. . . "It has been my pleasure to attend a two-week session at the AUDUBON CAMP OF CALIFORNIA and I can truthfully say that this was one of the finest educational as well as recreational experiences I have ever had"—

MR. OLIVER ADDS: "Two weeks at the Audubon Camp in the High Sierra is truly an exhilarating experience. The course, in addition to being highly instructional from the standpoint of usable materials and activities, clearly emphasizes the interrelationship of all plant and animal life as related to the welfare of man. Surely, if our nation is to maintain or improve its present standard of living, more people than at present will have to do something about protecting all resources, and this type of experience on the part of teachers is bound to have a beneficial influence on the rising generation. Because of the worthwhileness of this program, the In-Service Training Section of the Los Angeles City Schools has approved the satisfactory completion of a two-week course at the camp as a basis for point allowance toward a salary increase. Such approval is contingent upon the decision of the Committees appointed by the Superintendent. More than one hundred Los Angeles City teachers have attended the camp for credit and, according to reports, all of them are making good use of the many things they learned at the camp."

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Ever since mid-summer of 1950, military activity in Korea *has called for heavy transpacific air traffic by civilian cargo planes. Over one of their routes they fly a round trip of 13,450 miles—some 26 times the length of the famous Berlin airlift. Hundreds of companies help supply this operation. Maybe you'd like to know what it takes from an oil company to run an airlift.*

Standard's part in the Pacific airlift shows that it's a big help to have large companies on hand when the going gets rough. Our work is focused mainly at Wake Island, that pinpoint some 4000 miles from the U. S. West Coast. After World War II, Wake was a refueling stop for commercial airliners en route to the Orient. But then came the struggle at the 38th parallel—

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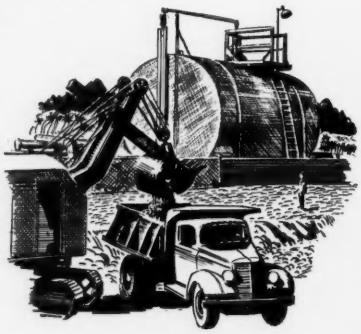

To secure the special loading equipment needed by the ground crews, a Standard ship picked up the nearest available—at far-off Canton Island. And at U. S. request, we helped build new storage facilities at Wake.

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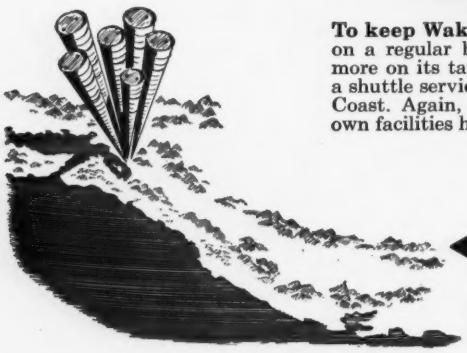
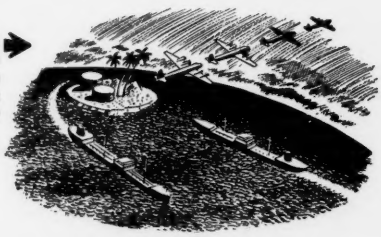


To keep Wake and the airlift supplied on a regular basis, Standard drew once more on its tanker fleet. We now operate a shuttle service to Wake from the Pacific Coast. Again, being big and having our own facilities helps us serve.



Of course, the transpacific airlift starts in America, and at home on this end of the route Standard keeps some 10 airlines supplied with aviation gasoline. It would take a stack of drums *a mile high* to hold our increased daily output for this use. At the same time, we're also supplying military needs . . . and our usual volume for motorists.

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